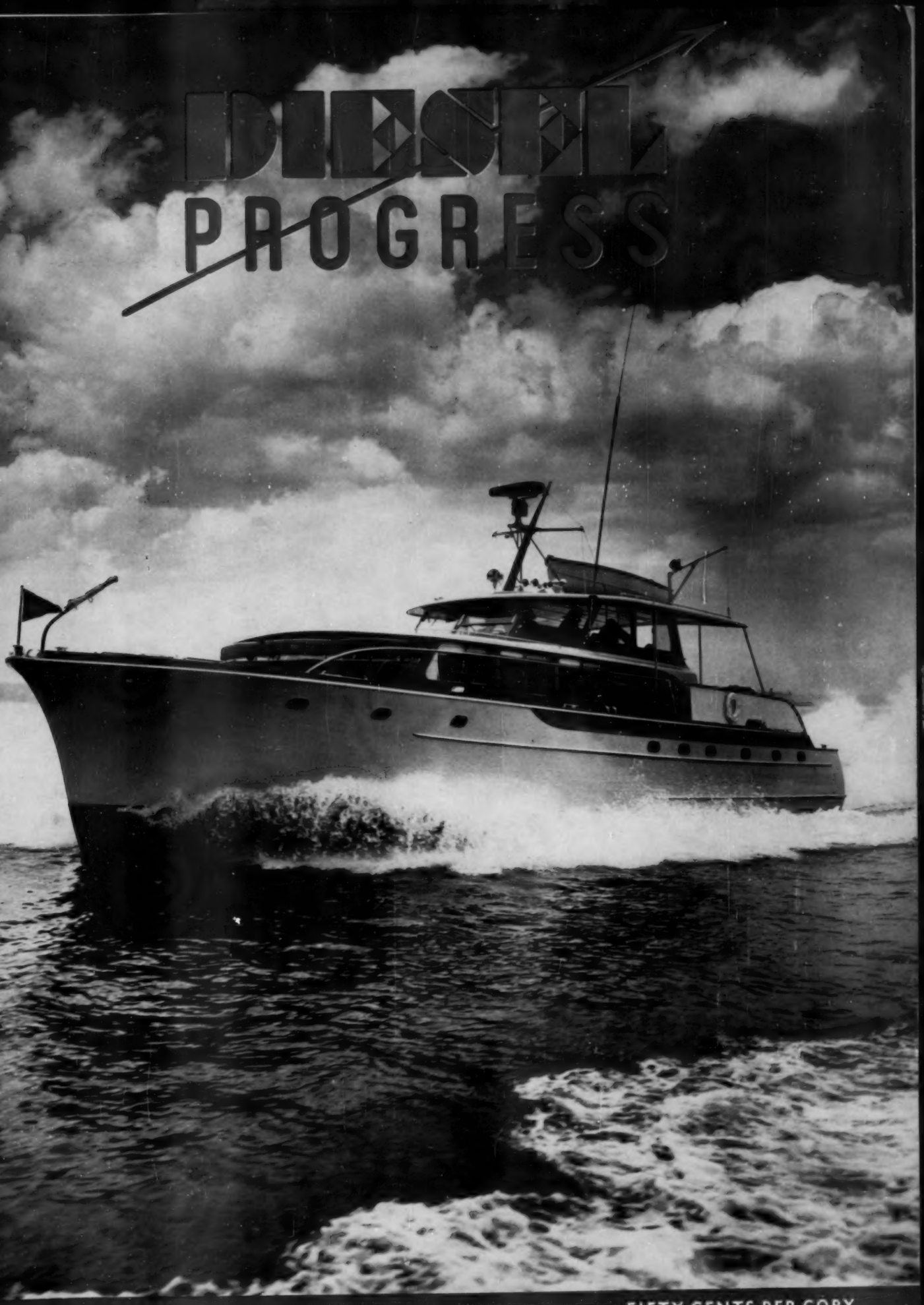
DIESEL PROGRESS

IN INDUSTRY • IN TRANSPORTATION • ON THE SEA • IN THE AIR



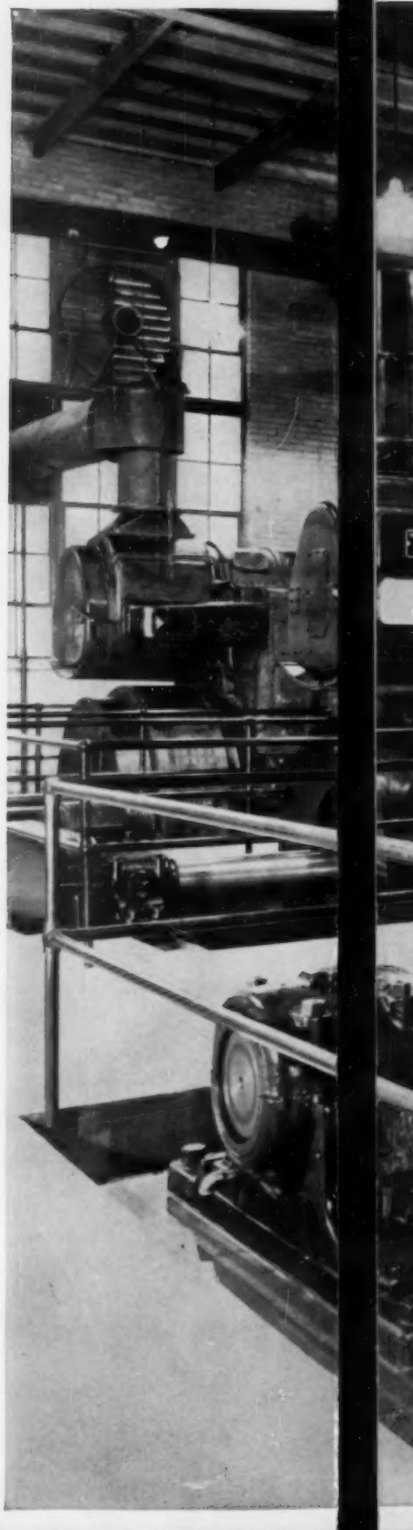
FIVE DOLLARS PER YEAR

JANUARY, 1957

FIFTY CENTS PER COPY

"Texaco Ursa Oil Heavy Duty is really doing a great job"

. . . reports Plant Superintendent



In this plant (name on request) all engines—three dual-fuel and two straight diesel—are lubricated with *Texaco Ursa Oil Heavy Duty.*

"A scheduled overhaul of one of our dual-fuel engines after 8,550 hours showed rings in excellent shape, wear on liners less than .0005 inch, no evidence of wear on bearings. Check-ups on our other units show substantially the same results."

Texaco Ursa Oil Heavy Duty is fully detergent and dispersive—with outstanding ability to inhibit oxidation, prevent rust and bearing corrosion, stand up under high temperature and pressure, minimize wear. It is one of the complete line of famous *Texaco Ursa Oils*—all designed to make diesel, gas and dual-fuel engines deliver *more power* with *less fuel* over *longer periods* between overhauls.

A Texaco Lubrication Engineer will gladly help you gain these benefits for your plant. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write The Texas Company, 135 East 42nd Street, New York 17, N. Y.

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METROPOLITAN
OPERA
radio broadcasts
every Saturday afternoon

TEXACO

TEXACO

URSA OILS

FOR ALL DIESEL, GAS
AND DUAL-FUEL ENGINES

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Harrison cools this diesel-driven rotary drill for rugged duty!

Boring into the earth . . . and Harrison's bearing down on the heat! Harrison oil coolers on the mighty diesel of this rotary drill keep temperatures under control . . . and help provide reliable, year-around service on rough, tough, fifteen-hours-a-day duty. These heat-exchangers are dependable, rugged and ready for all kinds of action . . . in every line of industry or defense. That's because they're backed by the research and experience of Harrison's 46 years in making top-quality heat-control products. If you have a cooling problem, look to Harrison for the answer.

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HARRISON
RADIATOR DIVISION, GENERAL MOTORS CORP., LOCKPORT, N.Y.

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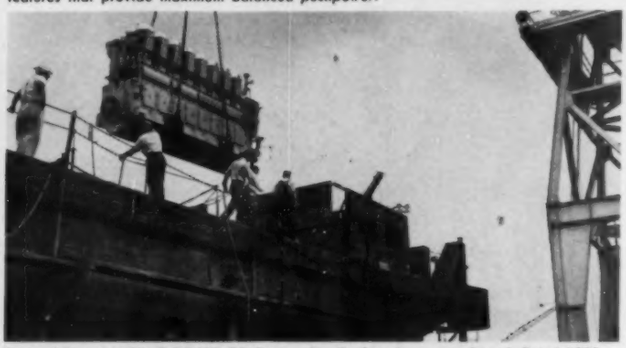
FRONT COVER ILLUSTRATION

The *Camargo III*, a 60-ft custom motor-cruiser deck yacht with raised and sunning cockpit, is powered with two 6-110 GM diesels, which give her a speed of 16 knots. She is owned by Julius Fleischmann of Naples, Florida and was built by Wheeler Yacht Co.

New Dravo Towboat

Enterprise-powered "Raymond E. Salvati" boasts new design and construction features that provide *maximum balanced pushpower.*

Built for Island Creek



One of her two Model DMG-38 Enterprise Engines is swung aboard. Rated 1280 HP at 600 RPM, engines swing huge 8½ foot propellers through reverse-reduction gears.

Powered by Enterprise

Rugged—still clean and compact—the two Enterprise Engines easily handle a fleet of 20—900-ton barges or 15 "jumbo" 1500 ton barges in continuous operation.

Meet the "Raymond E. Salvati"—148 feet of towboat brawn and beauty. Built by Dravo for Island Creek Fuel & Transportation Company, this new giant of the waterways is suitably powered with twin 1280 HP Turbocharged Enterprise Engines.

You can be sure the "Salvati" is destined for big things as she proudly takes her place serving the growing needs of the coal industry on the great Ohio River.

Information on the complete line of Enterprise Marine Engines—73 to 7703 HP—will be gladly furnished on request.

ENTERPRISE
dependable **ENGINES**

Over a million horsepower at work the world over!

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FRAM Water Separator and Fuel Filter Removes All Water, Traps Dirt and Dust!

Here's complete protection for your fuel injectors! A FRAM Water Separator and Fuel Filter on diesel engines pays off by:

1. Removing all water: saves injectors from pitting and corrosion!
2. Trapping dangerous dirt and dust: ends abrasive action once and for all!

For longer life, less wear, fewer repairs —guard your diesels with a FRAM Water Separator and Fuel Filter!

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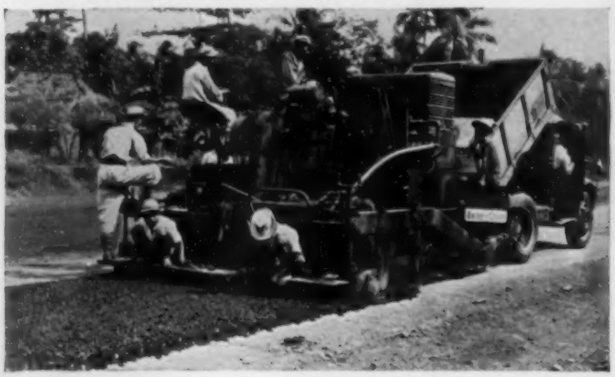
FRAM pioneers filter developments. For complete details on Diesel applications, write: FRAM Corporation, Providence 16, R.I., or Fram Canada Ltd., Stratford, Ontario.

FRAM
OIL • AIR • FUEL • WATER
FILTERS

An International UD-18A powers the cyclone dust collector and a UD-1091 operates the dryer in this Barber-Greene Model 848 bituminous plant owned by Hallet Construction Company, Ames, Iowa.

Rock County, Wisconsin, is now in the paving business with this Barber-Greene Model 848 Travel plant. Towing loader uses an International UD-350 and the mixer uses a UD-18A.

100% International power units and trucks is the rule for Hazelmore Bituminous Co., Fairmont, Minn. Their Barber-Greene Model 848 continuous-mix plant is powered by a UD-18A and a UD-24.



Even in Djakarta, Indonesia, the preference is for International power units. Here a UD-6 powers the government-owned Barber-Greene Model 879-A Finisher.

...WHY specify

International® Power Units

for bituminous plants?

These owners of Barber-Greene bituminous plants and pavers would give you these hard dollar reasons: Internationals have more features that pay off in lower production costs—and unsurpassed parts and service support for your convenience.

Economical? You bet, with a clean-burning exclusive injection and combustion system...a 45° angle of injection...new open-face single-orifice nozzles that give thousands of hours of coke-free operation.

Weather-proof? Definitely, with seconds-fast all-weather gasoline-conversion starting...full-flow filtering of all fuel, lube oil and air.

Dependable? Sure thing, with such features as tocco hardened crankshaft journals, precision insert bearings and replaceable hardened sleeves.

Heavy-duty? That's the only type of engine International has built in 55 years. And the positive-type valve rotators that make valve grinding such an infrequent need is just one of the famous IH long life features that have helped sell more than 400,000 diesels.

For more information, just see your easy-to-locate International Power Unit Distributor or Dealer. He'll provide proof you can specify and get an adaptable International power unit that's exactly right for your new or used machine. So be sure of profitable power for a long time to come by specifying Internationals for all of your driven machines.

INTERNATIONAL® CONSTRUCTION EQUIPMENT

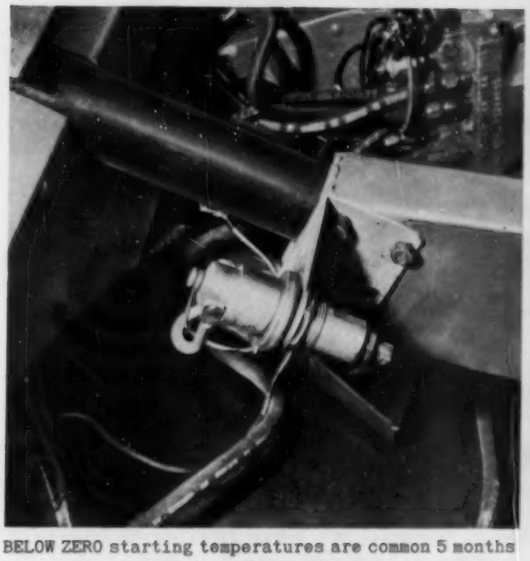
International Harvester Co., 180 N. Michigan Avenue, Chicago 1, Illinois

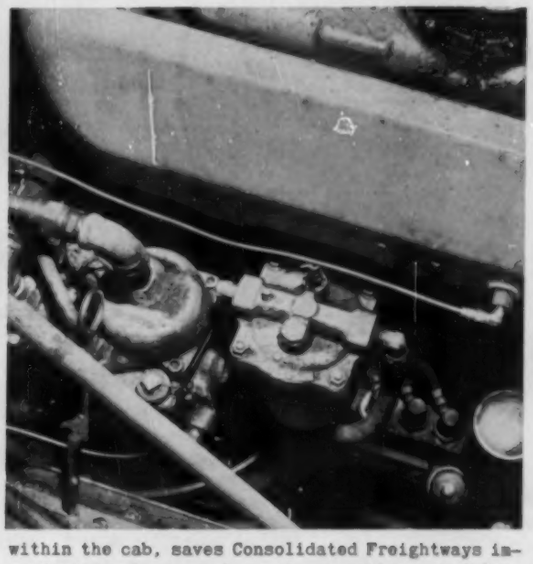
A COMPLETE POWER PACKAGE INCLUDING: Crawler, Wheel, and Side-Boom Tractors... Self-Propelled Scrapers and Bottom-Dumps... Crawler and Rubber-Tired Loaders... Off-Highway Trucks... Diesel and Carbureted Engines... Motor Trucks.

The Engineer's Field Report

CASE HISTORY
PRODUCT Chevron Pressure Primer System
FIRM Consolidated Freightways Inc., Portland, Oregon

Pressure Primer System starts diesels on 1st or 2nd turn with regular batteries—at minus 40°





BELOW ZERO starting temperatures are common 5 months a year for Consolidated Freightways equipment operating in Mountain and Plain States. Two hundred and forty-four of the company's tractors are equipped with the Chevron Pressure Primer System. Since this installation, rigs start on first or second turn at 40° below zero—using regular equipment batteries! Normally in these sub-zero temperatures, regular batteries give out after about 4 turns. Sure starts plus the fact engines are primed with Chevron Pressure Primer bulbs, controlled from within the cab, saves Consolidated Freightways important man-hours and speeds operating schedules. Picture above (left) shows a Chevron Pressure Primer Discharger mounted on steering column. Highly volatile priming fuel is atomized through tubing into manifold (right) under 250 lbs. pressure.

FREE FOLDER tells you more about Chevron Pressure Primer System and how to install it on different engines. Write or ask for it today.

FOR MORE INFORMATION about this or other petroleum products of any kind, or the name of your nearest distributor, write or call any of the companies listed below.

CHEVRON

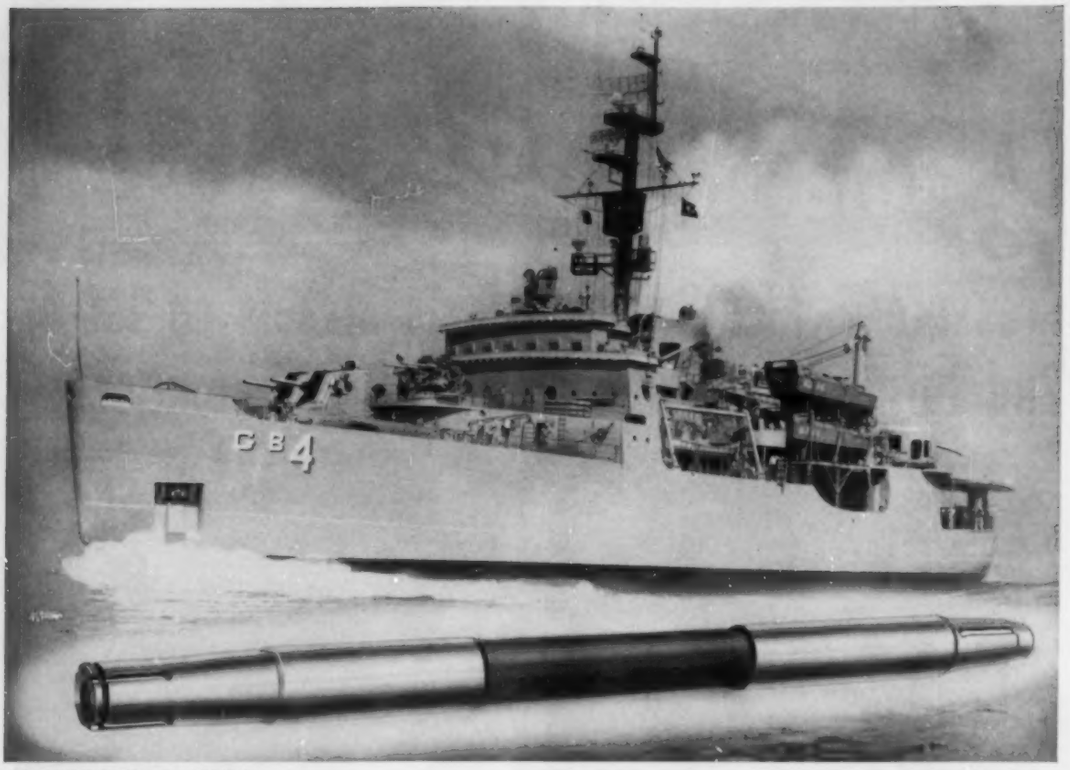
TRADEMARK "CHEVRON" REG. U. S. PAT. OFF.

Why Chevron Pressure Primer System helps starting

Volatile Chevron Priming Fuel atomizes in induction system at temperatures as low as -65°F. Pressure or weakest spark from engine fires mixture.

Simple, rugged discharger prevents fuel leakage. Small, safe steel bulbs protect fuel from water and dirt.

STANDARD OIL COMPANY OF CALIFORNIA, San Francisco 20 • STANDARD OIL COMPANY OF TEXAS, El Paso
THE CALIFORNIA OIL COMPANY, Perth Amboy, New Jersey • THE CALIFORNIA COMPANY, Denver 1, Colorado



OFFICIAL UNITED STATES NAVY PHOTOGRAPH
COURTESY OF THE INGALLS SHIPBUILDING CORPORATION

HORSEPOWER GOES TO SEA —

Another Erie Shaft Drives this Navy Ice Breaker

We use the word "another" because we have produced literally thousands of forged steel components for Diesel and Marine use. From raw material to finished product, under one control and with a single responsibility, forged steel cranks, drive shafts, connecting rods, special forgings for processing equipment and a diversity of steel castings for heavy industry are our daily accomplishment. Isn't it quite logical, then, to place your forged and cast steel components requirements with us? We shall welcome opportunities to consult with you.

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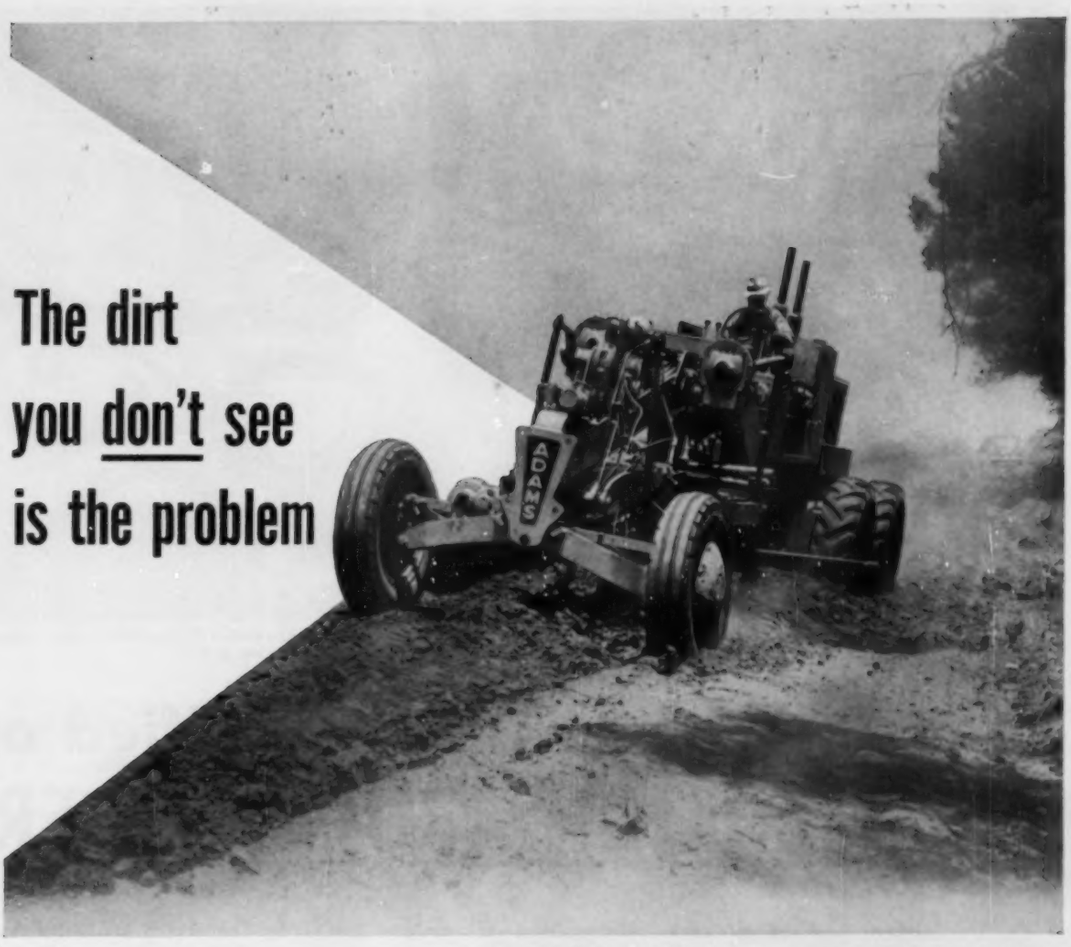


La-Tourneau-Westinghouse Adams "660" Grader, powered by 150 H. P. Diesel Engine

Dry Type Micronic® Air Filtration solves it

The tons of dirt this grader moves in a day don't give it any trouble at all. But just let a little of the dirt that's drawn in with the air intake get through to the engine and it'll stop dead in its tracks. That's why efficient air filtration is so vital to the operation of this equipment . . . why engine and equipment manufacturers have accepted PurOlator's new Dry Type Micronic® Air Filter as the most efficient yet developed.

Whether your engine is idling or revving at top speed, this new Purolator Air Filter removes 99% of all contaminants. That makes it virtually impossible for harmful abrasives to get into the precision parts of the engine no matter how dirty the job or where you're working. The Dry Type Micronic elements save time and effort in servicing, too. Elements can be replaced in one-tenth the time – and with one-tenth the effort – needed to service other types.

Purolator Catalog AFC-56 contains a valuable chapter "Facts about engine air requirements" that can help you prolong engine life and reduce repair bills. Send for your free copy today. Address Dept. DP9-110.

FILTRATION FOR EVERY KNOWN FLUID

PUROLATOR

PRODUCTS, INC.
RAHWAY, NEW JERSEY

Three of 69 standard model 25-ton Dart Trucks—all equipped with Fuller 4-MS-1440, 4-speed Transmissions—owned by Southern Peru Copper Corporation. This is part of a $2½-million order for 90 units, one of the largest of its kind ever placed.

FULLER Transmissions specified on $2½ MILLION TRUCK ORDER!

The Southern Peru Copper Corporation has ordered a fleet of 69 standard model 25-ton Dart Trucks, *all* equipped with Fuller 4-MS-1440, 4-speed Transmissions. This is part of a $2½-million order for 90 units, one of the largest of its kind ever placed.

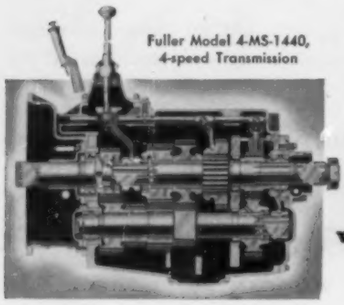
These trucks will be used for a dual purpose in the development of the huge Toquepala and Quellaveco copper deposits in southern Peru. First, they will help to remove the initial overburden, and later will haul copper ore from the open pits to the mine's concentrator.

The big, rugged, heavy-duty, off-highway Dart trucks—specifically developed for mining operations such as this—are designed and built to haul top payloads profitably, over the roughest terrain.

It is only natural then, that a dependable, durable, transmission was carefully selected to efficiently and effectively deliver power from the 335 hp Cummins N.R.T. Turbocharged diesel engine, through a Twin Disc Model CO Torque Converter. *That's why Fuller was specified!*

On job after job, where loads are the biggest and going is the toughest, you find Fuller Transmissions *putting horsepower to work efficiently and economically.*

Next time you order heavy-duty construction equipment, *specify* Fuller Transmissions. From over 110 models available for rubber-tired equipment, there's a Fuller Transmission designed to do *your* job.



Fuller Model 4-MS-1440, 4-speed Transmission

FULLER MANUFACTURING COMPANY
Transmission Division, Kalamazoo, Michigan

Unit Drop Forge Division, Milwaukee 1, Wisconsin • Shuler Axle Company, Louisville, Kentucky (Subsidiary) • Sales & Service, All Products, Western District Branch, Oakland 6, California and Southwest District Office, Tulsa 3, Oklahoma.

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DIESEL ENGINE

DESIGN AND PRODUCTION

Two great names—American MARC and Hallett—join forces to guarantee still greater value and efficiency in the design and production of an All-American line of the finest small Diesel engines.

Already, a new and larger plant is under construction to greatly accelerate the mass production of American MARC Diesels. The most advanced machine tools will assure the ultimate in quality control and standardization. New models are planned to maintain and advance the proud position of the Company as the American leader in the low-power, lightweight, air and water cooled Diesel engine field.

If you need a reliable, lightweight, full-Diesel for industrial or marine application—or as a prime mover of powered equipment—write for literature. American MARC's small size, low cost, modern Diesel engines will certainly appeal to your sense of value.

AMERICAN MARC INC.

ENGINES OF QUALITY

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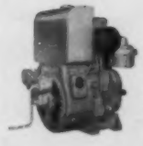
SOME desirable sales territories are still open.
Inquiries are invited from representative dealers.

- ★ **Air or Water Cooled; 5.5 to 25 hp**
- ★ **All-American, from basic materials to completed engines**
- ★ **Available as portable power units, generating plants, pumping units, or for marine propulsion**

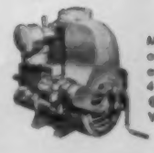
6-101



Model WC-1, one-cylinder, water-cooled, 4-cycle, 6 HP @ 1800 RPM. Wt.: 220 lbs.

Model A1Q-3KW, one-cylinder, air-cooled, 4-cycle, 3KW @ 1800 RPM. 6-7 HP

Model AC-2, two-cylinder, air-cooled, 4-cycle, 14 HP @ 1800 RPM. Wt.: 350 lbs.



Model AC-1, one-cylinder, air-cooled, 4-cycle, 6 HP @ 1800 RPM. Wt.: 220 lbs.

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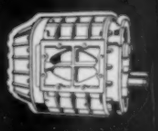
For
Road Building,
Truck, Bus,
and
Automotive Equipment



AT THE S. A. E.
1957 ANNUAL MEETING

SCHWITZER
CORPORATION
INDIANAPOLIS, INDIANA

Inset shows an Allis-Chalmers (Buda Division) 8M10290 gas engine, equipped with a Twin Disc Model B-118 Power Take-Off, powering a pumping unit that produces 1000 gpm at 320 ft.

"I wouldn't recommend anything BUT a TWIN DISC Clutch!"

Says Paul Poteet, West Texas engine dealer

"When a pumping unit goes down due to the power take-off," states Paul Poteet, manager of West Texas Manufacturing & Sales Co., Pecos, Texas, "it reflects on the whole system—including the engine. That's why I handle Twin Disc PTO's exclusively. I know from experience I can count on Twin Disc products to hold up—even under the roughest conditions."

If anyone knows the irrigation equipment business, Paul Poteet does. As the dealer for Buda Division, Allis-Chalmers Manufacturing Co., he has set unprecedented sales records. In the last two years alone, his firm sold more than 180 power units — *all equipped with Twin Disc Clutches!*

This engine dealer attributes, in no small measure, the part Twin Disc PTO's have played in promoting his outstanding sales volume. He estimates that better than 90% of the farmers in his territory are Twin Disc users.

Whether you're an equipment dealer or a farmer, you can profit from Mr. Poteet's experience with Twin Disc Power Take-Offs.

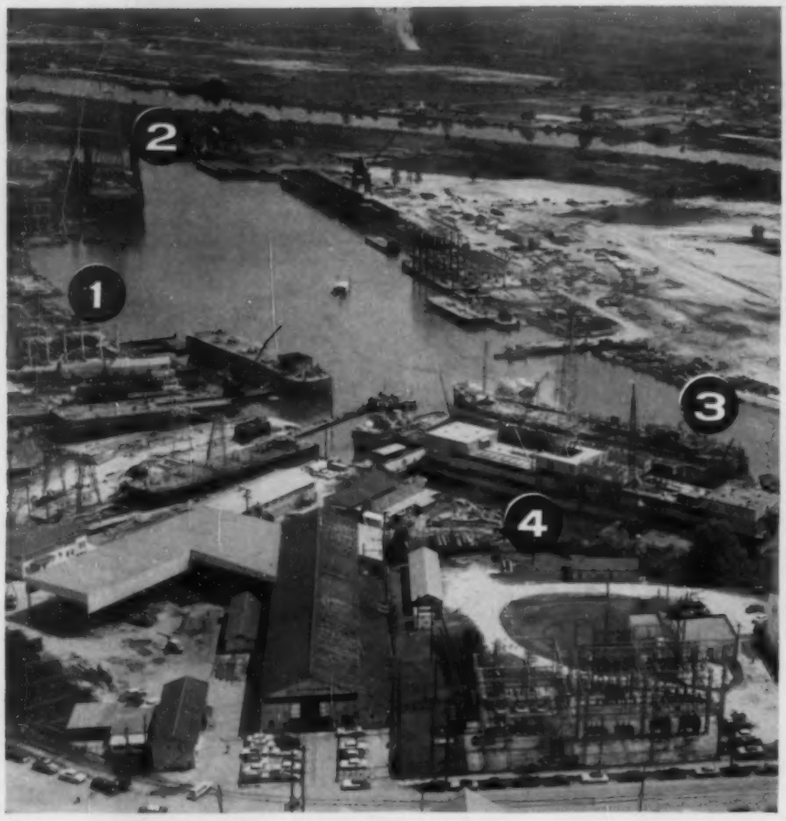
Designed and built for the most severe, heavy-duty service, these rugged PTO's are offered in triple-plate, 14" to 21"; double-plate, 11½" to 24"; single-plate, 6½" to 24" for all internal combustion engine applications up to 600 hp. For detailed information, write for Bulletin 304.

TWIN DISC
Clutches

TWIN DISC CLUTCH COMPANY, Racine, Wisconsin • HYDRAULIC DIVISION, Rockford, Illinois

BRANCHES OR SALES ENGINEERING OFFICES: CLEVELAND • DALLAS • DETROIT • LOS ANGELES • NEWARK • NEW ORLEANS • TULSA

Everything in sight is
DIESEL–ELECTRIC



Six rigs—four companies—all Diesel-Electric . . . and all ELECTRO-MOTIVE POWERED

This aerial view of the yards at Orange, Texas, tells more literally than words how Electro-Motive is being accepted in the drilling industry everywhere. In this one photograph, there are six different offshore rigs in various stages of construction for four different companies. All have one thing in common: *each is equipped with Electro-Motive Diesel-Electric Power.*

The unmatched flexibility, control and economy of Electro-Motive Power has made it the outstanding choice for deep drilling applications over water or land. See your Electro-Motive representative for complete details.

ELECTRO-MOTIVE DIVISION · GENERAL MOTORS
LA GRANGE, ILLINOIS

In Canada: General Motors Diesel Limited, London, Ontario

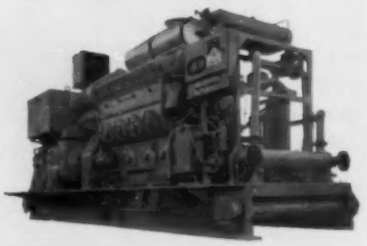
Petroleum industry sales offices: Tulsa, Oklahoma; Houston, Texas; Dallas, Texas; Morgan City, Louisiana; Pasadena, California.

1 Kerr-McGee's Rig No. 47, a mobile type drilling device, due for completion late this year, will contain three Electro-Motive Power units.

2 Rigs No. 54 and 55 for Offshore Company contain three 875 hp. Electro-Motive Power units each. These mobile rigs are capable of operating in 100 feet of water.

3 This tender, one of four being converted for a major oil company, will contain two 1200 hp. Electro-Motive Power units operating large mud pumps.

4 The Penrod Drilling Company's W. H. (Bill) Dordan and Tom Sorrell are both operating in the Gulf area for Placid Oil Company. Each contains three Electro-Motive Power units.



SR8-W 900 hp. Diesel-Electric power unit, with heat exchanger cooling. Unit includes 8-cylinder, 567C Diesel engine, all engine accessories, two 500-kw direct current generators, and generator control cabinets—all mounted on sub-steel base, 21-ft. long, 6-ft. wide and 9-ft. 7-in. high.

How Aitkin Light Plant came to choose STANODIESEL Oil M

Case story of exceptional results obtained with Standard Oil diesel lubricants

Because of plant operating conditions and generator capacity installed, Aitkin, Minnesota, Municipal Light and Power Plant had to operate a 1,235 H.P. Worthington engine over 38,000 hours before it could be taken out of service for complete overhaul. During that time, 19.2 million K.W.H. were generated. STANDARD HD Oil, predecessor to STANODIESEL Oil M was the lubricant.

When the engine was overhauled, all pistons were in good condition. All rings were free to move in ring grooves. There were no scars on cylinder liners. Piston walls were bright, wear was even. Based on this performance from STANDARD HD, plant management converted to the improved new oil—STANODIESEL Oil M—at the time of overhaul. STANODIESEL Oil M has been giving top performance ever since.

STANODIESEL Oil M is made from highest quality base stock. Additives help the oil resist viscosity change and keep parts clean. Other additives control foam, keep highly stressed parts lubricated.

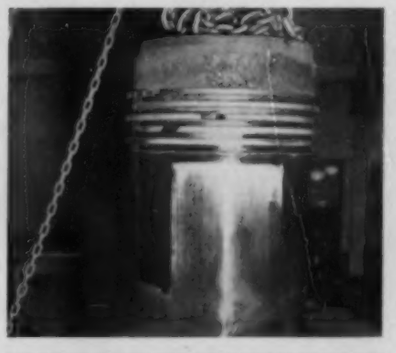
Get more information about STANODIESEL Oil M from your Standard Oil industrial lubrication specialist. There is one near you in any of the 15 Midwest and Rocky Mountain states. Or write Standard Oil Company, 910 South Michigan Avenue, Chicago 80, Illinois.

STANDARD OIL COMPANY
(Indiana)

STANDARD

John Acklestad, Aitkin plant superintendent, and Carl Klenner (left) Standard Oil industrial lubrication specialist check engine service record. Carl has been rendering technical service on lubrication problems at Standard Oil for eight years. He has a degree from the Michigan College of Mining and Technology and has completed the Standard Oil Sales Engineering School.

"As is" photo of piston removed from engine after 38,000 hours of service. Rings were free.



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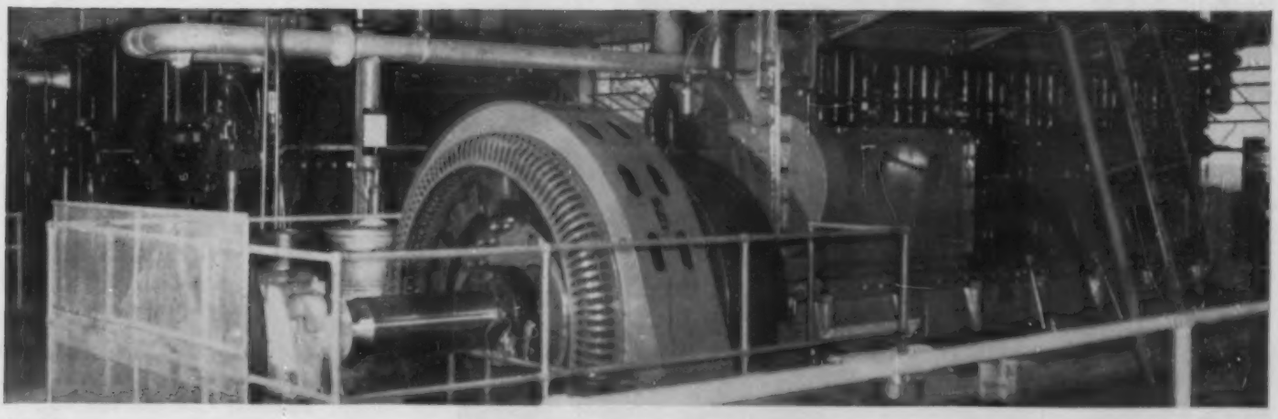
- Combats deposit and wear problems imposed by use of economy fuels.
- Maintains film on difficult to lubricate areas and parts.
- Eliminates spark plug fouling in spark ignited gas engines and reduces combustion chamber ash and deposits in engines burning natural gas, LPG and liquid fuels.
- Eliminates fuel injector and pump sticking caused by deposits on injector barrel and plunger where fuel and lube oil commingle.



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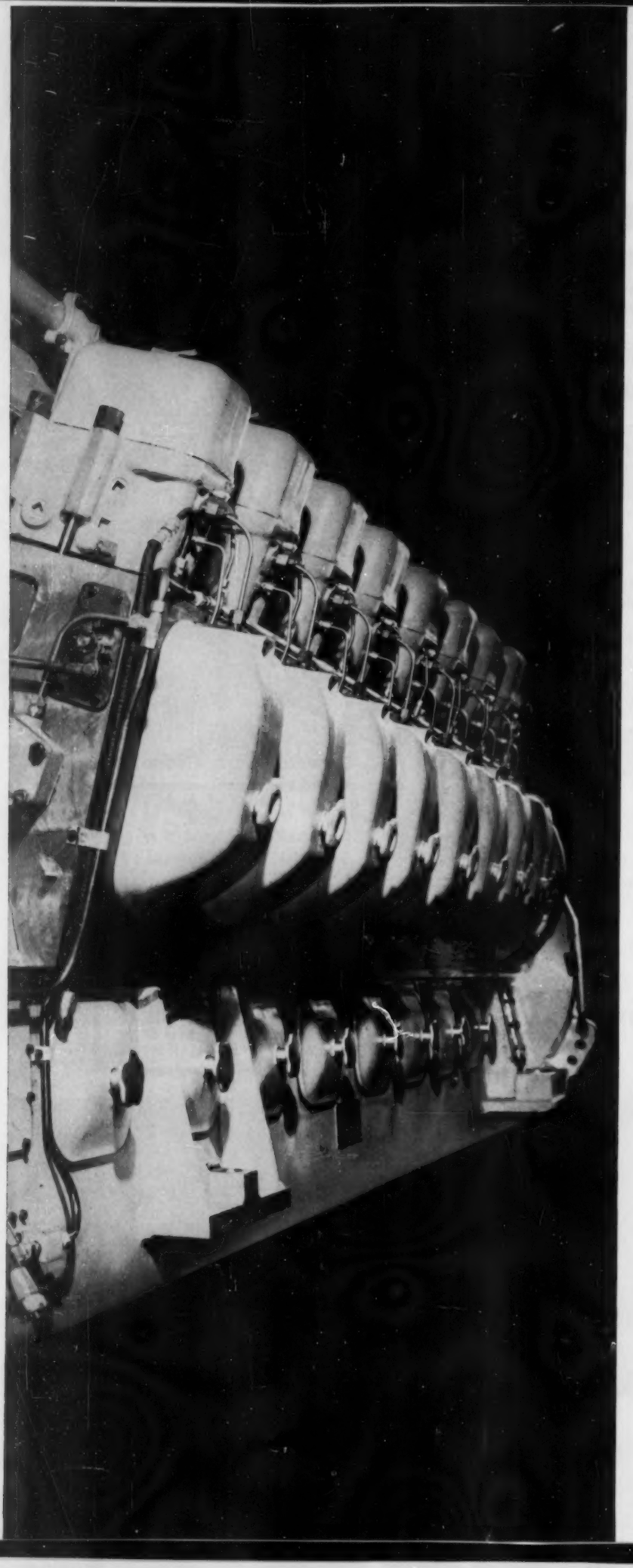

ALCO TRIMS WEIGHT BOOSTS POWER CUTS COSTS IN MODERN MODEL 251 DIESELS

The ALCO 251 diesel is made for today's requirements of stationary service. Its base and block are rugged weldments for lower weight, higher strength than old-time castings. Four-point mounting eliminates grouting and heavy foundation costs. Use of modern proven materials in the power section extends the life of the 251 diesel, too, and maintenance is easier and less costly.

More power per pound is provided by improved fuel injection, modern turbosupercharging plus an air aftercooler. The basic 251 diesel can be easily adapted to any stationary service by simply adding standard parts, including dual fuel, and it is especially suitable for automatic or remote operation.

ALCO's regional warehouses—seven located throughout the country—give speedy service on parts orders. This, plus the fact that all models of the 251 diesel have interchangeable parts, means that your parts inventories can be kept low.

If you would like more information on the advantages of the ALCO 251 diesel, contact your nearest ALCO sales office, or, if you wish, write for Bulletin DE-6 to Transportation Products Division, Dept. TR-3, P. O. Box 1065, Schenectady 1, N. Y.

Condensed Specifications for ALCO 251 Diesels

No. Cyl.	Bore and Stroke (in.)	RPM Range	BHP Range	Approx. Wt Dry (lb)
6	9 x 10½	350-1000	350-900	22,100
12	9 x 10½	350-1000	1100-1800	32,650
16	9 x 10½	350-1000	1470-2400	42,000

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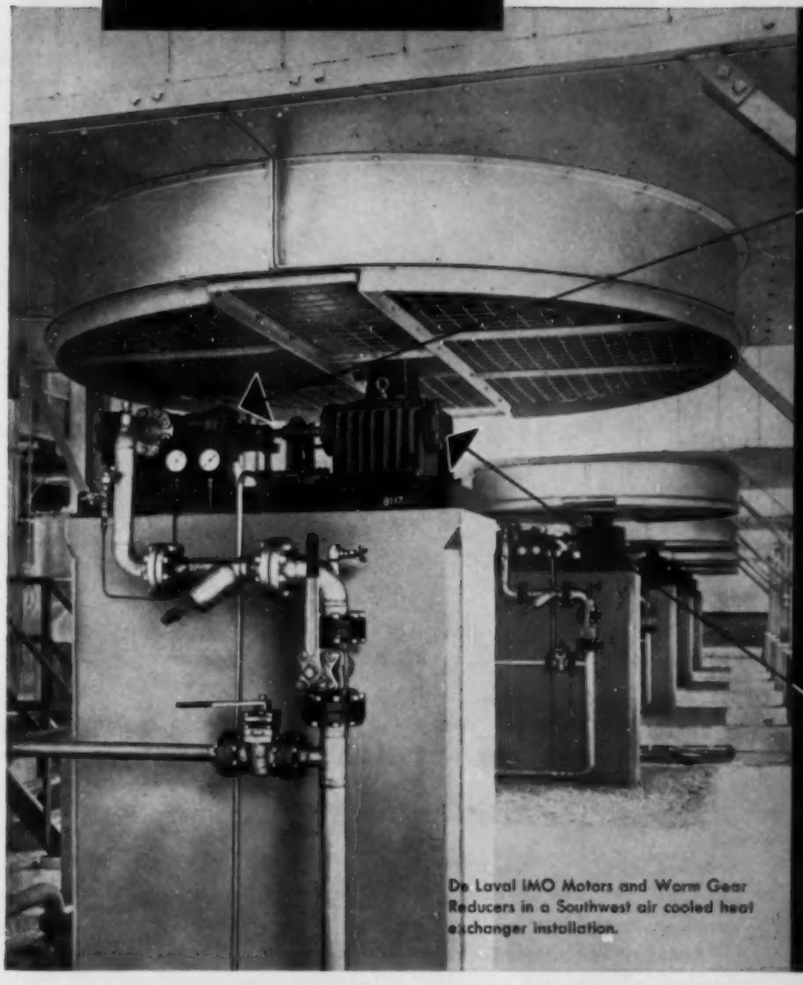
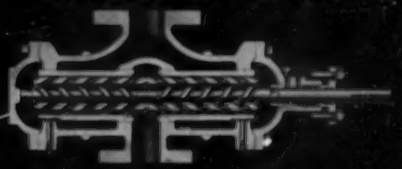


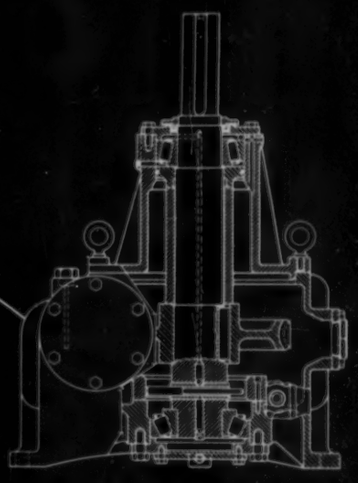
De Laval IMO Motors and Worm Gear Reducers in a Southwest air cooled heat exchanger installation.

De Laval IMO Motors and Pumps



simple, reliable, pulsation-free

De Laval Worm Gear Speed Reducers



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De Laval Hydraulic Fan Drives for air cooled heat exchangers and cooling towers *save power* since the fan operates at full speed only a portion of the time. Furthermore, there is no demand charge on hydraulic power. • Equally important, they provide *accurate, automatic* control of engine jacket water temperature, and also assure *complete operational flexibility*. Due to the simplicity of De Laval IMO motors and pumps as well as the rugged construction of De Laval Worm Gear Reducers, these units stay on the job for years. Both IMO motor and speed reducer are mounted and factory aligned on a single bedplate.

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DL370

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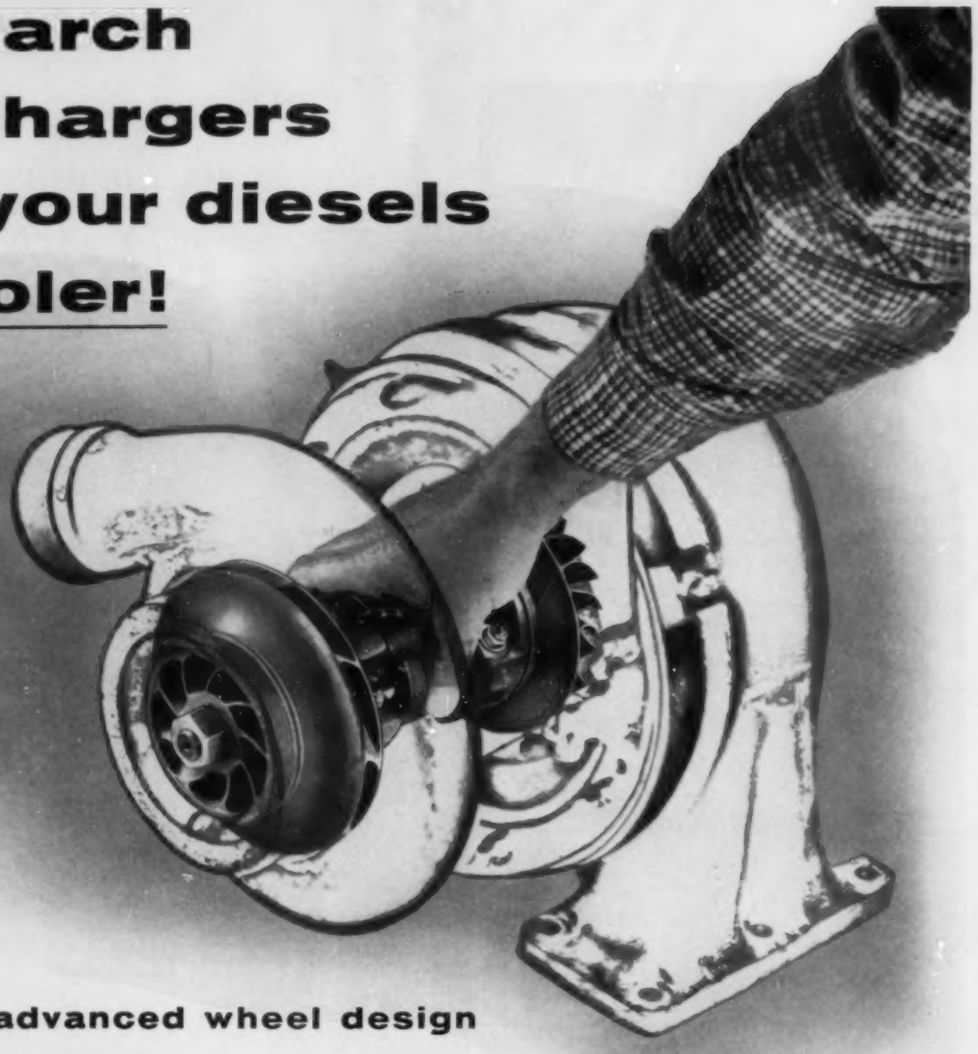

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Ambient air is compressed with an efficiency as high as 82%, feeding a maximum weight of air into the cylinders at the lowest possible temperature.

Results: maximum power gain at minimum fuel cost; complete combustion with elimination of objectionable smoking; low engine thermal loading insuring long, trouble-free operation.

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BASIC SPECIFICATIONS FOR AIRESEARCH TURBOCHARGERS

MODEL	T-10	T-14	T-15	T-30-2	T-30-6
Diameter — in. nom.	9	11.5	15.25	15.25	16
Length — in.	9	14.12	16.75	17.25	21.75
Weight — lb.	40	95	125	135	195
Output — lb/min. (Standard Conditions)	25-40	35-65	35-65	70-95	115-175

THE GARRETT CORPORATION

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DESIGNERS AND MANUFACTURERS OF TURBOCHARGERS AND SPECIALIZED INDUSTRIAL PRODUCTS

TWENTY MULE TEAM GOES OPEN PIT

By JAMES JOSEPH

GROWLING diesel earthmovers are burrowing deep into a secluded, 25-acre stretch of Mojave Desert, removing some 7½ million tons of overburden, laying bare what is probably the world's richest deposit of borax. By next spring dieselization will have gouged a 130 ft deep open-pit mine—the first in borax production. Dieselization's muffled roar there on the Mojave is resounding in Washington and in scores of top-secret U.S. research labs where scientists are putting together a new batch of chemically-based super fuels for aircraft. Among the most promising of fuel-elements is boron, derived from borax, which in itself is usually found as a compound of boron, sodium and oxygen. U.S. plane-makers believe boron may power a whole new family of higher and faster-flying war birds.

Officially, the Pentagon has for some time guardedly talked about super fuels and the engines and planes that will use them. Only recently has it announced that a super fueled plane is now on the competitive drawing boards both at North American Aviation and Boeing Airplane Co. As of late November, 1956, word out of Washington hinted that the Pentagon's interest in super fueled planes is growing, that topbrass believe mineral-based fuels the intermediary step between hydrocarbon fuels used today and atomic power of tomorrow. Specifically: in scores of U. S. plants, compounds of boron, lithium and other basic chemical elements are being concocted into fuels and into power-boosting additives—ready for testing when the U. S.'s first chemically fueled bomber—designated the WS-110—comes off the drawing boards. And everywhere, boron is mentioned as a prime source of this new dimension in bomber power. Why boron? Because it packs tremendous energy compared to its weight—far more energy, in fact, than comparable poundages of currently in-use jet and rocket fuels.

Thus, the abuilding open pit borax mine, near Boron, Calif., home base for big U. S. Borax & Chemical Corp., has special significance. For with the open pit in operation, and with a new $18-million refining plant operative at pit's edge, U. S. borax output will be substantially increased (mining engineers say this one mammoth installation could, with addition of some machinery, boost total American borax production by more than 50 per cent). And just as diesels are right now getting down to borax, so will diesels, some 12 Kenworth 802 rear-end dump trucks, powered by Cummins NRT-300 turbocharged diesels, be handed the job of hauling the ore to the near-pit mill.

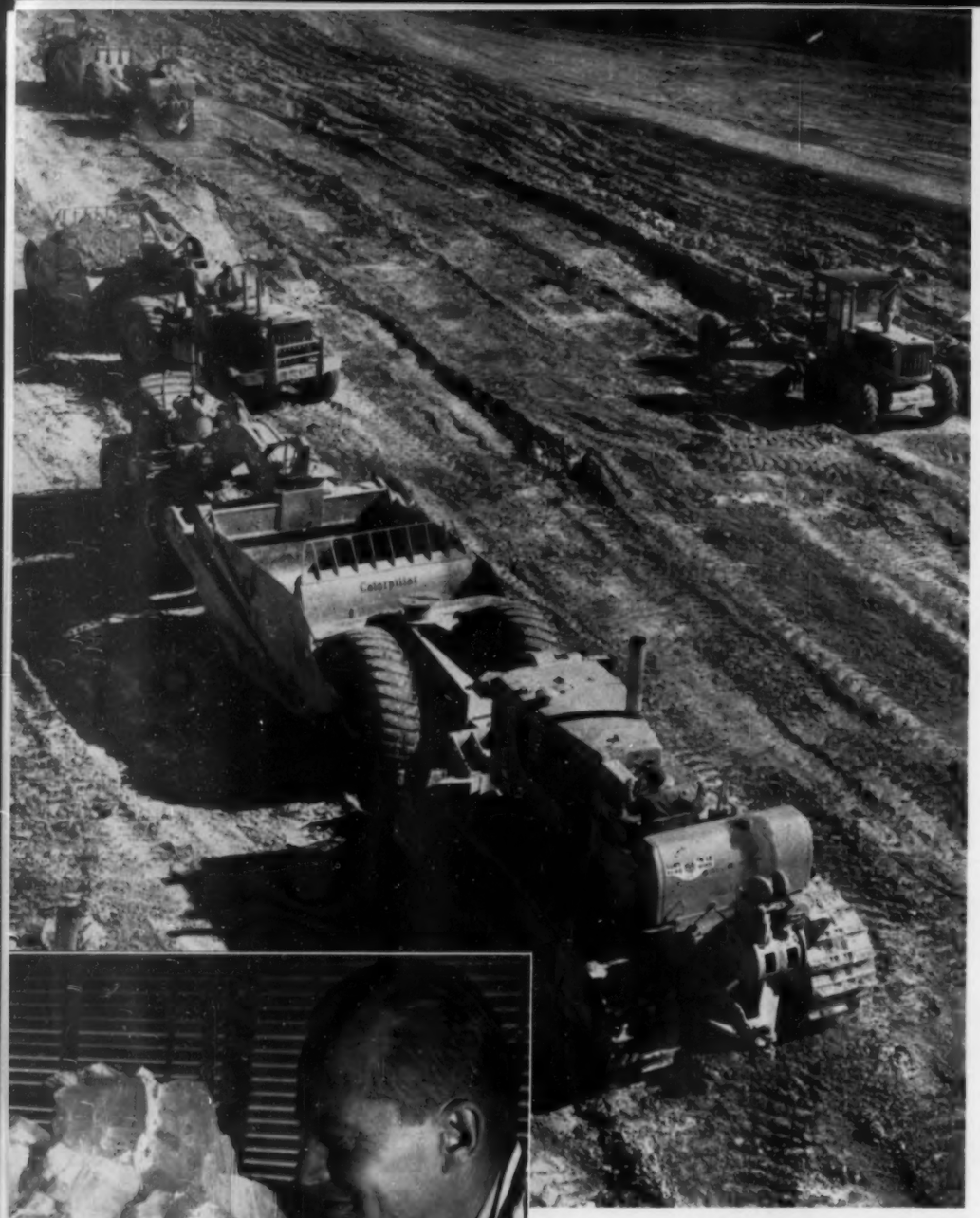
At U. S. Borax & Chemical Corp.'s Mojave operation within earshot of the pit-digging diesels, acting general superintendent E. D. Lemon explains the reason for gouging the open pit. "Underground mining, modern as it is, gets out only about 40 per cent of the deposit," he says. "Fully 60 per cent has to be left to support the mine structure. These inherent percentages apply even to our Jenifer mine, opened in 1951, even though it's almost fully automated by continuous miners, shuttle cars and belt haulage. But from an open-pit operation, you can recover very nearly 100 per cent of the deposit."

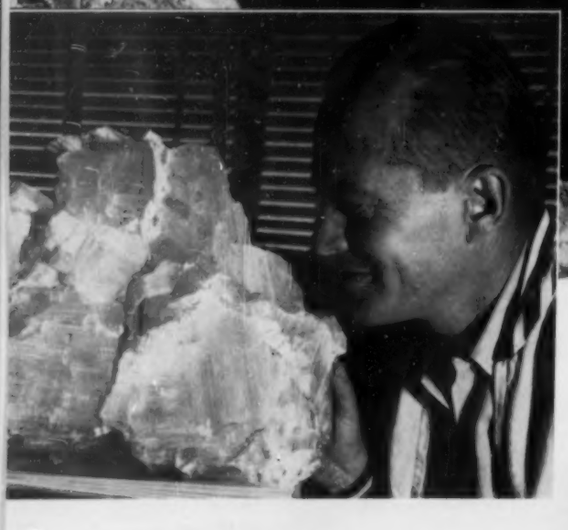
It's toward this goal—open-pit operation—that diesels have been laboring since early January, 1956, when low-bidder Isbell Construction Co. (headquartered in Reno, Nevada) began removal of the overburden. Isbell's contract is for 9½ million tons of overburden, though with removal of about 7½ million tons, the pit should be open and operative. The additional 2 million tons will widen the pit, keep ahead of initial borax production.

The ore body—about a mile long, some 2000-3000 ft wide and varying between 100 and 300 ft thick—lies in an elongated, east-west direction some 130 ft beneath the desert. The prime mineral, sodium borate or Tincal, is overlaid with shale, clay, some less valuable but boron-bearing oxides and typical dry-lake sedimentation. It's this overburden which Isbell is removing. The contractor, well on schedule, is removing about 22,000 tons daily, working two shifts, some 35-40 shifts a month. Monthly removal approximates half a million tons. At work are some 25 pieces of heavy-duty diesel equipment. Among them: 15 scrapers (3 Caterpillar DW 20s, 5 Euclid S18s, 7 Euclid 14TDTs—all Euclids with 6-110 GM diesels); 3 Caterpillar D-9 push-bladed tractors; a couple of D-8s with pull rippers; a Euclid LDT rigged with a 7500-gallon water tank; 2 Caterpillar Model 12 motor graders and assorted auxiliary equipment.

The pit, when finished, will measure approximately 900 x 1400 ft, will cover about 25 acres. Benches are 50 ft high, some 40 ft wide and are being laid out as future haul and access roads. Over-all slope of the pit's face is about 35-degrees. Slopes on 50 ft benches in the alluvium overburden are ½ to 1, and ¾ to 1 in soft shale (moisture content of the alluvium is 8 per cent, for clay, about 15-18 per cent). Spiraling out of the abuilding pit is a 7 per cent grade, a 60 ft wide compacted dirt road. Thus, for U. S. Borax & Chemical Corp.'s ore trucks, the only real problem will be encountered on the short upgrade haul pit-to-mill. Returning to the pit, rigs will haul empty.

Pit benches rearing behind it, big scraper lumbers up seven percent haul-road grade—enroute to the dump area. The benches in background give you some idea of the tremendous amount of overburden moved in this huge operation.





Scrapers given helping push by Cat D-9 pushers in the U. S. Borax & Chemical's open-pit near Boron, Calif. in the Mojave Desert.

Acting General Superintendent, E. D. Lemon, and prime sample of borax compound.

Getting down to the base mineral in creating an open-pit mine. Darker areas in pit are low-grade borate minerals, overlaying richer ore.

material is directed to a special stockpiling area. Later, it will likely be reclaimed and blended with the prime, higher-grade ore. Some overburden is also helping to strengthen U. S. Borax & Chemical's levee system . . . the some 2500 ft of dikes and levees which divert flash floods from the presently operating mine and concentrator. Says Robert E. Kendall, mining engineer, one of the designers of the pit, "dikes, some of them 12 ft high, should assure us a dry pit. The only water we contemplate in the pit will be from direct rainfall."

For years, U. S. Borax and Chemical has girded its operation with protective levees. They now ring the concentrator, have been extended by Isbell to protect both the future mill and pit. Typically, levees have been thrown up on the north, uphill side of the property. One levee is 3 miles long, 48 to 134 ft across the base, 20-40 ft across the top which rises to a height of 8 ft. All levees are compacted, and most are associated with a diversion

This photograph and the one opposite are reproduced through the courtesy of Euclid Division of General Motors. It shows one of the twelve Detroit Diesel model 6-110 powered Eucs owned by Isbell Construction Company at work being pushloaded on this huge new open-pit operation.

In pit construction, D-8s drag rippers over the overburden. Both Caterpillar and K-30 rippers are being used. They plow to a depth of about 2½ ft in the generally soft shale and clay. Behind them work scrapers. The S-18s have a 28 ton payload, the Euclid 14 TDTs, about 24 tons. As an empty scraper arrives in the pit, after dumping its load in either of two dump areas, a push-bladed D-9 falls in behind, acts as pusher. The haul is a short one, though with a purpose. Most of the overburden is going into the construction of a wide, level, well compacted future stockpile area. However, when, as the work nears the prime ore body, various borate deposits are uncovered, this

The future borax diggers are waiting impatiently to get into their part of the act. They are Bucyrus-Erie 54B's, electrically operated.

canal system, which drains sections cut by culverts. Says mining engineer Kendall, "we're working in one of the most arid regions in the U. S. We average only about 5 in. rainfall a year, and we may get that total in one or two big storms. Flash floods are an ever-present danger."

Meantime, at Isbell's operational base (less than a mile from the pit), project manager Arnold Blair has set up a complete diesel maintenance shop. "We can," he says, "repair everything from engines to axles here." Summer's heat has made it rough on men and machinery. "But," says Blair, "we kept going." And, though Isbell diesels have worked thru some borax mineral deposits, the material, observes Blair, seems to have no effect upon equipment. Matter of fact, diesel drivers come out of the pits clean-handed after a borax haul, as though they'd but recently washed up with U. S. Borax's famed 20 Mule Team Boraxo. For, after all, borax's principle use until now has been just that—a cleanser. Right now, Blair is working 65 men on both shifts, with the night shift working under lights that are strung around the pit's perimeter. Floodlights are spaced 300 ft apart, use 2000-watt bulbs, are powered by 110 volts. Blair says flatly that maintenance-wise his shifts are finding the going no tougher . . . nor more unusual . . . than on the average job.

Already on hand is much of the equipment scheduled for the pit, including electric shovels and the first of the diesel ore-haulers. Initially, U. S. Borax & Chemical will deploy three Bucyrus-Erie, 54B shovels in the pit, each rigged with a 3-yard dipper. Two will work while the third stands by. By judicious placement of shovels, it's expected that various ores can be blended by truckloads, keeping the pit's mineral output uniform. On hand is the first of a dozen Kenworth 802, rear-dump, 24-ton capacity ore-haul trucks. Their Cummins 335 hp Turbocharged engines and Allison 3-speed Torqmatic transmissions are calculated to negotiate the pit's 7 per cent loaded-climb with ease.

Ore-haulers will run on tubeless tires, this to reduce friction, especially during the torrid summer. Borax poses few maintenance problems. Thus, unlike iron ore haulers, trucks have no special provision against abrasion. Additionally, a D-8 dozer will work cleanup around the shovels. And a Caterpillar Model 12 motor grader will keep the haul road in shape. A Ford F-600, mounting an Alemite lube rack, will tend pit-bound machines. Already nearing completion near the mill—and only about half a mile from pit's bottom—is the future ore-truck overhaul shop, a tilt-up concrete building 50 x 200 ft, installed with a full, 10-ton overhead crane and a recessed lube pit. Maintenance teams, now serving U. S. Borax's underground mine, are in training to take over the preventive maintenance chore when mining becomes an open-pit operation. Right now, U. S. Borax figures to start stripping operations in the open pit about April 1957.

Scene of the world's first major open-pit borax mine as the stripping of seven million yards of overburden lying to a depth of 150 ft got underway. Euclid scraper below is swinging around with its load for the mile and a half run to the dump. Pit is approximately 1500 feet square.

This big Cat D-9 tractor features the latest in diesel and accessory advances — a turbocharged engine driving through a Twin Disc three stage torque converter.

Typical of application of diesels in smaller, versatile equipment is this IH Model 12 Payloader with a capacity of 1¼ cu yds. This unique earthmoving machine is powered by an IH 91½ hp diesel.

DIESELS DOMINATE THE ROAD SHOW

THE 1957 ARBA Road Show to be held in Chicago from January 28 to February 2 at the International Amphitheatre on the south side next to the big Chicago stockyards will be an event of singular importance to those who manufacture, buy and use diesel engines in the road-building industry. Nowhere will there ever be found in one place more and varied types of earthmoving and roadbuilding equipment, which as the discerning eye will be able to tell, are practically all equipped with diesel engines as the prime moving power source. Diesel engineers have played a very important part in the important advances made in roadbuilding equipment design since 1948. They have designed engines of sufficient power, flexibility and life to permit the successful and widespread use of the high speed, high capacity earthmoving equipment of today. It will be well to trace briefly some of the more important advances made in diesel engines and their allied accessories since 1948, and in particular in the past three years, because these advances are key factors that contribute tremendously to the increasing technology and efficiency of the roadbuilding art.

Since 1948, we have seen a general diesel development trend going toward the direction of lighter weight engines with more horsepower per pound of engine weight. This has been particularly pronounced in new engine designs but also is reflected in refinements in existing engines. One of the key factors contributing to this trend has been the increased use of supercharging, and more recently, of turbocharging. Turbocharging is very important because it increases engine power with negligible parasitic load on the engine, and also contributes to better fuel economy. There will be many turbocharged diesels on display at the Show by a wide variety of engine manufacturers. Improvements in combustion chamber design and in fuel injection equipment have helped in the development of more responsive engines and better fuel economy. Lighter, simpler fuel injection systems stand out here. Higher rotative speeds have been also adopted to increase power output. Bearings, rings, and other key accessories in the engine have improved with higher engine output to insure an effective and long engine life. Probably the most dramatic accessory development, and certainly one of the most important, has been the increased use of torque converters and torque converter transmission combinations in roadbuilding equipment in recent years. This type of power transmission has proved itself in service to contribute greatly to longer equipment life, faster work cycles, greater operator comfort, and it has provided equipment designers with an important tool in the continuing job of building better, faster, and more flexible equipment. The diesel engine is ideally suited to the torque converter for many applications in roadbuilding, and their use together will continue to increase. Filtration equipment, both air and oil, should be examined closely too because this equipment is very important to the successful operation of diesels, particularly in the dusty conditions found on many roadbuilding jobs. Many new filters have been developed to give better and more complete protection to the powerful diesels of today.

Those who attend the Show will notice that diesels are not only installed in the large, heavier pieces of roadbuilding machinery, which has been their conventional application in the past, but are installed in many types of smaller equipment that formerly were powered by gasoline engines. This is due primarily to the development of better small diesels, which have a favorable power to weight ratio, permitting their effective utilization in lighter equipment where space is a very important factor. Also contributing to this trend has been the desire on the part of contractors to equip their operations with one type of prime mover—the diesel—for reasons of easier and more efficient maintenance and supply as well as for the established facts of superior diesel fuel economy and operating stamina.

One more important point that should be brought out in connection with this mammoth Road Show is that only part of the diesel story will be shown and seen here. The rest of the story is being and has been written out in the field where diesel engine manufacturers have set up excellent distributor organizations to take care of engines in the field and assure the contractor that when he is in need of help, the engine manufacturer, through his distributor, is there to give it to him when he needs it. We need only to look at the many bids recently that have shaved thousands of dollars off state highway department estimates to realize that the roadbuilding contractors have confidence in the fact that their diesel driven equipment can be relied to get on the job, stay on the job, and complete it on schedule.

Another diesel application in lighter earthmoving equipment is this Michigan Turbodozer, powered by a Waukesha turbocharged 165 hp diesel driving through a Clark torque converter.

Here a twin-engined 388 hp Euclid TC-12 crawler tractor is pushloading a powerful TS-18 Euclid scraper, with an engine in front and one in back to give maximum power to the wheels. GM Detroit diesel engines driving through Allison torque converters and torqmatic transmissions provide the power for this tractor-scraper combination.

This bulldozer with teeth, an Allis-Chalmers HD-21, features a supercharged Allis-Chalmers Buda diesel driving through a torque converter, which give it plenty of power and the exceptional maneuverability well illustrated here.

GREENSBORO, N. C.

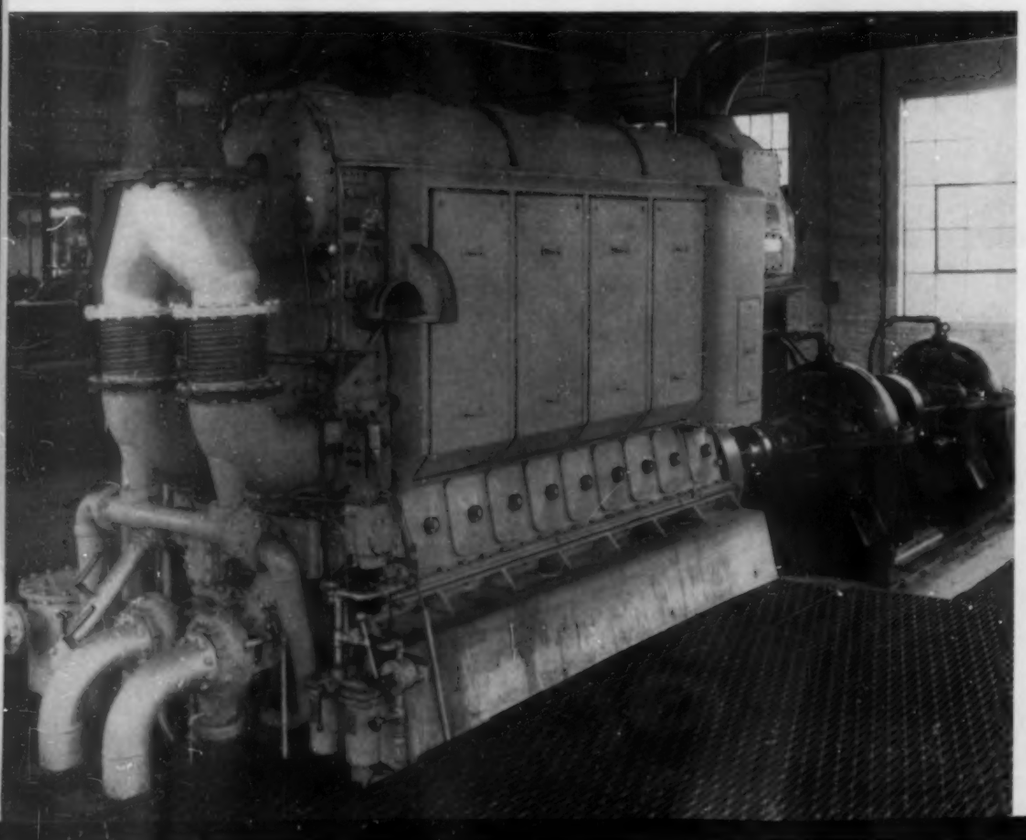
By DOUGLAS SHEARING

POSSIBLY no other city in the country is as anxious to grow or has better prospects for solid growth than Greensboro, N.C. Located in the rich agricultural and industrial Piedmont section of the state, it is surrounded by a trading area of more than 1,300,000 people and has already become one of North Carolina's leading shopping and retail centers. Long a textile center—the home of the largest denim manufacturer in the world—it has recently achieved a better-balanced, sounder economy by attracting a wide range of diversified industries, such as tobacco, steel, medicinal products and paper. Its population in the last ten years has increased from 63,000 in 1944 to 81,000 in 1954, not counting an even more impressive growth in suburban areas. In addition, it has become a thriving insurance capital, one of the most important in the South.

To keep pace with this expansion, Greensboro has had to grow with it. The city has had to supply the additional housing needed, the new and repaved roads, and the new public services. In 1950 alone the city issued building permits for construction evaluated at more than $17,000,000. It has gotten a head start since the end of World War II on a $5,000,000 project designed to repave all 90 miles of dirt streets still remaining within the city limits. If Greensboro is to continue to woo new industries away from other localities, city officials know that they will not only have to offer the best facilities available, but they will have to guarantee that these facilities will grow with the community. Soon after the end of World War II, the city's 54-year-old water supply system began to show signs of lagging behind the demands of an increased population and industry, and Greensboro focused its attention on this utility. In two steps, the first taken in 1948 and the second in 1953, the system's five outmoded steam turbine-driven pumps, installed at two pumping stations, were replaced with four Fairbanks-Morse diesel-driven units, thereby increasing the capacity of the stations by 26.5 mgd. and 29 mgd., respectively. Between 1947 and 1955, 60 miles of new mains and distribution lines, ranging in size from 6 in. to 30 in., were laid and a new 1½ mgd. tank was constructed to raise and stabilize system pressures.

To date, the city's water department has spent almost $2,500,000 in expanding facilities, about $2,000,000 going into the distribution system and $500,000 into the supply system. Before the current program is completed, an additional $2,750,000 is expected to be spent, covering the cost of expanding the filtration plant to 20 mgd., the completion of a new raw water line from the reservoir to the filtration plant, the addition of new mains into outlying districts, additional raw water supply, elevated storage etc.

View of the 1280 hp, 8-cylinder, Model 38D8-⅛ Fairbanks-Morse engine driving two 20-in. single-stage, double-suction, horizontal pumps at the City Station. Shown in this view are the engine-mounted Woodward governor, Nugent duplex fuel-oil filter and Air-Maze full-flow lube oil strainer.



With the installation of the four new Fairbanks-Morse diesel-driven pumps, ranging in capacity from 11.5 mgd. to 20 mgd., the situation improved somewhat, but the bottlenecks still existed at the reservoir and the filtration plant. By fiscal 1953-1954 the demand had reached an average of 10.2 mgd. and for the first time peaks exceeded 13 mgd. This meant that for extended periods of several days in 1953 and 1954 the demand actually surpassed the output of the system's filtration plant and the city had to call upon its pure-water storage to see it through. Even this, however, was not enough during the long drought of late summer and early fall in 1954 when virtually no rain fell for two months and the city had to resort to rationing in order to preserve essential services. The 6½ in. of rain which accompanied Hurricane Hazel filled the reservoir and restored normal service—but the city was still faced with an average demand that was only 1.8 mgd. below the peak capacity of its filtration plant and 1.3 mgd. below the dry-spell capacity of its only reservoir.

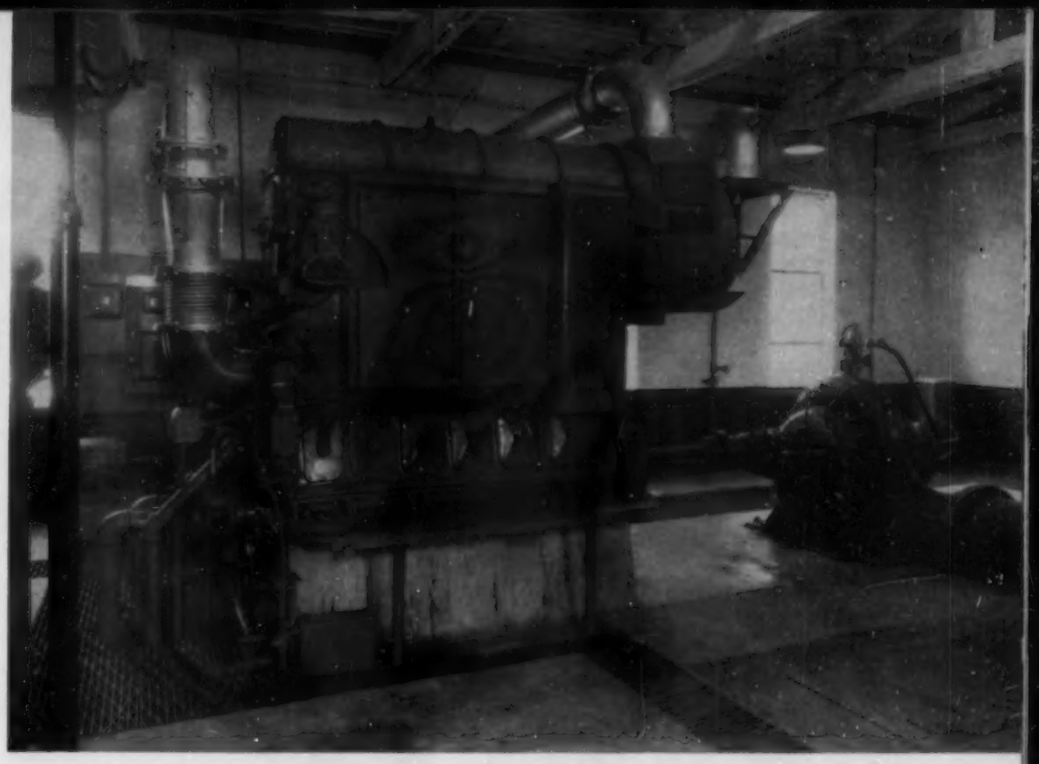
It is a credit to the sound planning of city engineers handling the expansion program, and to the modern equipment installed, that despite heavy pressure the expansion achieved to date has been as much in the direction of increased efficiency and economy as it has in the direction of increased capacity. Since the installation at the Reedy Fork pumping station (which draws raw water from the reservoir and sends it to the filtration plant) and at the City pumping station (which draws filtered water from storage and sends it through the distribution system) the four Fairbanks-Morse diesel-driven pumping units have cut over-all operating costs at both stations by an average of 55.7 percent. This includes the costs of fuel, maintenance and labor, and in fiscal 1953-1954 amounted to a gross saving of $46,372. Since the water supply system is operated under the city's Public Service Department on a self-sustaining basis, all revenues over and above operating costs are transferred to the system's construction fund. As a result, the money already saved by the new diesel equipment, as well as all subsequent savings, will be used to help defray the expenses of future expansions. This will aid local water consumers directly by lightening the water rent burden and will also aid them indirectly by supplying the additional water capacity needed to continue the city's current prosperity trend. Additional dividends include a substantial capital investment saving, made possible by installing compact diesel-driven equipment instead of higher cost steam turbines and boilers, and the restraining effect an increased water supply will have on local fire insurance rates.

The first of the four new diesel-driven pumps installed was a 16-in., Fairbanks-Morse, single-stage, double-suction, split-case, horizontal, centrifugal pump driven by a 450-hp, 6-cylinder, Model 32E14 Fairbanks-Morse diesel engine. This new medium-head high-capacity unit was placed in operation at the Reedy Fork station in February 1948 and increased the rating of the station from less than 15 mgd. to 20 mgd. Rated at 12 mgd. at a total dynamic head of 156 ft the new pump replaced a pair of 27-year old 6-mgd. horizontal pumps, series connected and driven by a single low-pressure turbine. From the day it went into operation, the new Fairbanks-Morse unit has been operated at

constant speed and delivery and has been assigned as the station's base load unit. As a standby the department retained the second of the two steam-driven units installed at Reedy Fork, a pair of similar series-connected pumps, rated at 9 mgd. and originally acquired in 1926. This unit is still in place, but is never used. The second of the new Fairbanks-Morse diesel-driven pumping units was installed at the City Station and consist of a pair of 14-in. single-stage, double-suction, split-case, horizontal, centrifugal pumps series-connected and driven by an 805-hp, 300 rpm, 7-cylinder, Model 33E14 Fairbanks-Morse diesel engine. Placed in operation a month after the first pump in March 1948, its addition permitted the department to retire three 9 mgd. steam-turbine-driven pumps at this station to standby duty.

The third of the new diesel-driven units was not installed until March 17, 1953, when the city's average consumption had risen to almost 10 mgd. Placed in operation at the Reedy Fork station, it is a 20-in., Fairbanks-Morse, Fig. 5813NS, single-stage, double-suction unit, similar to the 16-in. pump installed in 1948, and driven directly through a flexible coupling by a 640-hp, 720 rpm, 4-cylinder, Model 38D8-⅛ Fairbanks-Morse opposed-piston diesel engine. Rated at 17 mgd. at a discharge head of 156 ft., it brought the capacity of the Reedy Fork station up to 38 mgd., including the 9 mgd. standby pump. The fourth pumping unit installed as part of Greensboro's post-war expansion program followed the third by four days and was placed in operation at the City Station on March 21, 1953. Consisting of two series-connected 20-in., Fig. 5813NS, Fairbanks-Morse centrifugal pumps, similar to those described in the preceding paragraph, the unit is driven directly through flexible couplings by a 1280-hp, 720 rpm, Fairbanks-Morse, Model 38D8-⅛ opposed-piston diesel. Rated at 20 mgd. at a total dynamic head of 305 ft, it is equipped with 31½-in. impellers and is operated alternately with the smaller 14-in. unit. Together these two diesel pumps have increased the City Station's capacity to 53.5 mgd., including the 27 mgd. standby.

As previously mentioned, despite the pressure under which this heavy pumping equipment and auxiliaries were installed, it is a credit to the men who planned the overall expansion program that the city's water supply system has been improved in efficiency and economy as well as in capacity. To substantiate the operating cost savings of $43,-645 reported for fiscal 1953-1954, the city's Public Service Department released the following operating data. According to Mr. W. M. Lybrook, Director of Public Service, and Mr. N. L. Mitchell, Superintendent of Pumping Stations, the steam-turbine-driven pumping units in the city's water supply system, at the time they were replaced and retired to standby duty, were averaging a consumption of 15.25 lb of coal per million gallons lifted 1 foot at the Reedy Fork station and 10.59 lb of coal per million gallons lifted 1 foot at the City Station. At a 1953-1954 delivered price of $9.50 per ton at Reedy Fork and $8.30 per ton at City, this means that, had they still been carrying the full load at each station the last year, the steam-driven units would have averaged an estimated $10.87 per million gallons in fuel costs at Reedy Fork and $11.56 at City. These averages cover the cost of pumping against the full discharge head of each station in the city's network.



View of the Fairbanks-Morse 640 hp opposed-piston diesel at Reedy Fork driving a Fairbanks-Morse 20 in. horizontal centrifugal pump.

In contrast to this, in fiscal 1953-1954, the two Fairbanks-Morse diesel-driven units at Reedy Fork consumed a total of 173,000 gallons of fuel in lifting 3,729,804,656 gallons of water against a maximum head of 156 ft. This represents an average fuel consumption of 0.297 gallons per million gallons lifted 1 foot. At a delivered price last year of 10.6¢ per gallon for fuel, this indicates an average fuel cost at Reedy station last year of only $4.92 per million gallons. By converting from steam to diesel, therefore, the Public Service Department cut fuel costs at this station by 54 percent, or $5.95 per million gallons.

The two Fairbanks-Morse diesel pumping units at the City Station, meanwhile, consumed a total of 294,790 gallons of fuel last year in lifting 3,691,-150,381 gallons of water against an average head of 263 ft. This represents an average fuel consumption of 0.304 gallons per million gallons lifted one foot and, at the same 10.6¢ delivered price for fuel, an average fuel cost for the station of $8.46 per million gallons against the average head. The fuel-cost savings introduced by the new Fairbanks-Morse pumps, therefore, averaged $3.10 per million gallons, representing a reduction of 26 percent. To complete this estimate of operating cost reductions introduced by the four new Fairbanks-Morse diesel-driven pumping units, the total cost of maintaining all boilers, turbines, pumps and auxiliaries at the two stations during fiscal 1946-1947, the last complete year under steam power, was $4,999. Comparable costs at both stations during 1953-1954, including all expenses encountered while breaking in two new diesel pumping units, was only $1,569. This reflects a clear saving of $3,430, to which should be added the eliminated labor cost of $9,387, representing the annual cost of firemen needed to tend the boilers at both pumping stations. The result is a total maintenance-labor cost saving of $12,817. Combined with the savings in fuel, which amounts to $33,635, the total reduction in operating costs introduced by the four Fairbanks-Morse diesel-driven pumping units during 1953-1954 amounts to $46,452. In percentages, this is the equivalent of a 55.7 percent reduction in operating expenses.

In terms of thermal efficiency, the improvements in operation at both pumping stations have been equally impressive. At Reedy Fork, where the steam turbine-driven pumps formerly in service averaged a consumption of 15.25 lb of coal per million gallons per foot, the coal used had a rating of 13,500 Btu per lb. This means that the units were operating at a rate of 205,875 Btu per million gallons per foot. The two Fairbanks-Morse diesel-driven pumps now installed, on the other hand, use a No. 2 diesel oil which is rated at approximately 139,000 Btu per gallon. By averaging 0.297 gallons per million gallons per foot last year, they operated at the rate of 41,283 Btu per million gallons per foot, a vast improvement over the former average. At City Station, meanwhile, where the same types of coal and fuel were used, the thermal efficiency averages have tumbled from a level of 142,965 Btu per million gallons per foot under steam to a level of 42,256 Btu for the same amount of work done under diesel drive. All of this has been accomplished by the four diesel-driven pumping units in addition to their principal function in raising the individual capacity of each station to the level needed and in helping the City of Greensboro to complete one of the most vital phases of its post-war expansion program.

CONVEYER BELT INTO PHILADELPHIA

By ARNOLD B. NEWELL

THE Delaware Boatman looking back down the years would remember the spick and span new diesel tug *B. M. Thomas* attracting considerable attention on the river where steam was still commonplace. Smart was the word for it and powerful, too, with her new 500 hp Nelseco destined to perform yeoman service for a quarter century and then be replaced with a more powerful 900 hp 12-567 General Motors diesel. The *Thomas* in later years had to keep pace with the trend of the times and that trend had gone to higher power—for example 1800 hp on the twin screws of the newest boat in the Warner fleet, the *Christina*. By comparison to commercial towing fleets, this company's tugs are not numerous but they are busy the year around, six days a week and every year each one of them covers about 20,000 miles with a tow, for a tug running free in the sand and gravel trade is sheer nonsense. The Warner Company as described in the October 1956 issue of DIESEL PROGRESS, is a somewhat exalted sand and gravel outfit, with many sides to its extensive operations.

They come honestly by their utilization of the river for the family operated in Delaware Valley trade in connection with a general supply business in Wilmington over a century and a half ago. They had been in coastwise service and their ships traveled to the Carribean but they concentrated upon and stayed with the Delaware River and finally put it to work as a part of their conveyor belt, which moves the aggregates of Bucks County to points of Central Mix Concrete distribution in Philadelphia and in Wilmington. Raw materials are also sold at and delivered from these distribution points strategically located to serve the largest market area within the time available for delivery of mixed concrete before it starts setting. The diesel driven tugs, and the new towboat *Christina* and the steel barges they tow enter into this picture as conveyances operating in synchronization with the split-second timing of the mixed concrete movement. To diverge for a moment from the boats, this mixed concrete operation is under scientific control in order to produce cement or concrete to the exact specifications of the purchaser. Every element in the formula is weighed or measured with the precision of a prescription. Although the tugs participate there is no very close connection between them and the mixing plants. Theirs is an endless, slogging, 6-day-per-week job, night and day fair weather or foul in the movement of sand and gravel.

There are many navigational firsts in the company's history but I shall restrict this to only one which is the introduction of a typical Mississippi River type of towboat or pusher to the Delaware, locally looked upon as considerably more a seaport than a river despite the fact that it runs salt free to Reedy Island. It offers no long stretch to be covered such as the Great Rivers of the Middlewest and for that reason pushing with all its efficiency is essentially restricted to specialized operation such as that of the Warner Company who up until the advent of the *Christina* had towed astern in the manner of the salt water boat. Three tugs move the bulk cargo from the point of production near Morrisville to the distribution plant. They are the *Pennsbury* with a 700 hp General Motors engine, the *Thomas* with her new 900 hp GM diesel and the 1800 hp *Christina*. In a previous article reference was made to the land-locked boats on Van Sciver Lake and the others on terminal service at Pennsbury. However, there is another important tug in the fleet, the *Deborah*, which works with the dredge *Franklin* and was in fact given the name of Benjamin Franklin's wife because the tug and the dredge would be teamed up. This tug is powered by a Caterpillar D386, 12-cylinder diesel rated 320 hp at 1200 rpm and equipped with a Falk Airflex transmission having 4.03:1 speed reduction.

At the start of the journey of sand and gravel to highway paving and engineering projects, little diesel tugs like this one make 25-minute voyages with only one barge on the man-made Van Sciver Lake.

Design wise the *B. M. Thomas* with low pilothouse is especially suited to work on the Schuylkill which she does, thereby confining the work of the *Pennsbury* and the *Christina* to the Delaware proper. The Warner Company, restricted as it is to the movement of its own products has none the less gained a vast amount of experience with different kinds of tugs in this area and are no doubt better qualified than some other operators to evaluate the performance of a flat bottom, twin-screw pushboat. The *Christina* which has now been in operation about a year is a vessel 95 ft long, 38 ft wide and has a 10 ft 6 in. depth of hull. She is of welded steel construction and designed by her builders the Alexander Shipyard of New Orleans, La. who have had a vast amount of experience in the building of similar boats for Mississippi River services. However, in view of the extensive practice of towing astern on the Delaware, the *Christina* is also

With only 9,000 tons ahead the *Christina*, with power provided by two 900 hp GM Cleveland diesels, moves off down the river at a good clip. At times the tow is twice this size and maneuvered easily in the heavy traffic along the Philadelphia waterfront.

equipped with conventional bitts and power capstan on the after deck which is somewhat more spacious than the same area of a river boat exclusively employed in pushing service. Following river practice the power plant is in fact two complete units, the central elements being a pair of 900 hp General Motors 12-cylinder v-type engines, Model 12-567 rated 900 hp at 744 rpm. Each is equipped with Falk R&R gear set with 2.5:1 reduction ratio. There are two General Motors auxiliary engines driving Delco generators. One is a 6-71 with a 60 kw generator and the other is a 3-71 direct connected to a 30 kw generator. The electrical system is 120 volt dc.

The *Christina* is a 3 decker with comfortable quarters for captain and men in texas and the deckhouse. There is a modern galley with electric refrigerator, deep freeze storage, store room for canned goods, Elisha Webb oil burning Webb-perfection galley range and seating capacity for six at the table. Prior to placing the *Christina* in this service there had been some pushing with conventional tugs and in this way time was saved, but the handling of barges in the congested river proved to be a problem that could be overcome only with a boat designed and built for such service. That the *Christina* fits into the picture very well and performs efficiently is evidenced by the fact that she can handle 20 barges loaded with 1000 tons each on the run down from the Pennsbury terminal plant. Actually, the largest tow thus far has been 19 such barges. Ability to maneuver such a large tow in the heavy water traffic at Philadelphia is a distinct advantage. In fact the advantages in this day and age are not measured in terms of superiority of the diesel over other forms of power but rather in the more effective utilization of the only kind of engine that can be used. In this instance the economy is traceable to effective over all performance in a field where neither steam nor gasoline engine power has any place.

While it is undoubtedly true that one and perhaps two more boats of the *Christina* class will be put into this fleet the round bottom tugs are essential and for that reason we shall present the particulars of the *Deborah* which is fairly new and extremely useful. Here we have a day boat with galley and mass room but no sleeping quarters. The dimensions are length 56 ft 3 in., beam 17 ft 8 in., depth 8 ft 9 in. and draft 7 ft 6 in. The propulsion engine is a Cat D 386 rated 320 hp with a Falk 4.03:1 reduction and reverse gear set, the propeller being a Ferguson 4-blade 66 in. diameter x 44 in. pitch. The auxiliary power is a Lister Blackstone single cylinder 9 hp unit driving an Imperial Electric 32 volt dc generator rated 5 kw. The fuel capacity is large in order to save the time otherwise spent in going for bunkers. The deep tank forward carries 835 gal. and the one aft carries 1580 gal. Construction is of welded steel throughout by the Wiley Manufacturing Company of Port Deposit, Md. In this boat we find efficiency, dependability and all that is needed for use around the big dredge *Franklin*.

As operators of diesel propelled boats, the Warner Company has some advantages over transportation companies without other kinds of diesel driven equipment. With the diesel locomotives, cranes, dredges, and all the other kinds of dieselized equipment there is full justification for the provision of special maintenance facilities at the Burks Street terminal. Here one man is a diesel specialist whose responsibility it is to keep all the engines in proper running condition. Also at this terminal the company has a floating drydock for the docking and overhauling or painting of all floating equipment. The large number of barges in the fleet provides the need for a drydock which is also used by the tugs and the new towboat as well. It has been established that broad experience in the use of diesels in many different kinds of services within the company provides tremendous advantages in the development of operating techniques that will get the most service out of the engines at the lowest operating cost.

For over a quarter century the *B. M. Thomas* has been a familiar figure on the Delaware, and now with her new 900 hp GM Cleveland diesel, she backs away and makes a pretty picture in her natural element.

DIESELS SPEED PROGRESS OF A 30 MILE PIPELINE

By J. W. BROWN*

A NEW 16-inch pipeline running eastward from a metering point near South Lyons, Michigan to a distribution station on Coolidge Highway in Royal Oak, Michigan was laid recently for Consumers Power Company by the Somerville Construction Company of Ada, Michigan at a cost of approximately $750,000. This 30-mile pipeline job is one of four spreads on which the Somerville Company simultaneously employed diesel equipment. The other spreads were in operation at Peoria, Illinois; Cedar Rapids, Iowa; and Toronto, Ontario. The pipeline will carry natural gas from the Panhandle Eastern Pipe Line Company and from natural gas fields and storage wells in Michigan. It will greatly strengthen the natural gas supply system of many communities in Oakland, Wayne and Macomb counties.

The job of laying this pipeline called for a big variety of equipment including ten pipelaying and bulldozing tractors, two or three shovels, two ditchers and a number of trucks, lowboys, pipe-wrapping machines and truck-mounted electric welding sets. Among the tractors were three Caterpillar D-7 and two Cat D-6 diesel pipelaying tractors and also working on the spread were three IH TD-18 tractors with Superior side-booms, two TD-14 bulldozers and a Cleveland 240 ditcher powered by an International Harvester UD-14 diesel engine. The International Harvester equipment was purchased from Wolverine Tractor and Equipment Company of Detroit and Grand Rapids; the Caterpillar tractors from Michigan Tractor and Machinery Co. of Detroit.

To keep this equipment in tip-top shape while working on the job the Somerville Company used two large van-type trailers for maintenance. The trailers were centrally located at 13-Mile and Middlebelt Road and carried an assortment of oils, greases and maintenance equipment. With an average amount of swampy areas, road crossings and streams, the Somerville crew maintained a pace of approximately 2,000 ft a day, completing the job early in November. One spot where this pace slowed down was in the northwest part of Detroit where the line runs along busy 13-Mile Road. Here the Somerville Company had to work side-by-side with a heavy flow of traffic and at the same time take extreme care to preserve the lawns and trees of residential property.

The big lift. Here are an IH TD-18A tractor and a Cat D8 tractor teaming up to lift a long string of pipe into the ditch at a tie-in point.

*Detroit Editor DIESEL PROGRESS

A Somerville mechanic adjusts the conveyor roller on the model 240 Cleveland ditcher, powered by an International Harvester diesel engine.

This Cat D8 tractor was used to support the pipe-wrapping machine. In more congested areas, ready-wrapped pipe was used.

In swampy areas this Link-Belt Speeder backhoe powered by a Caterpillar D-315 diesel did the ditching for the 16 in. gas pipe.

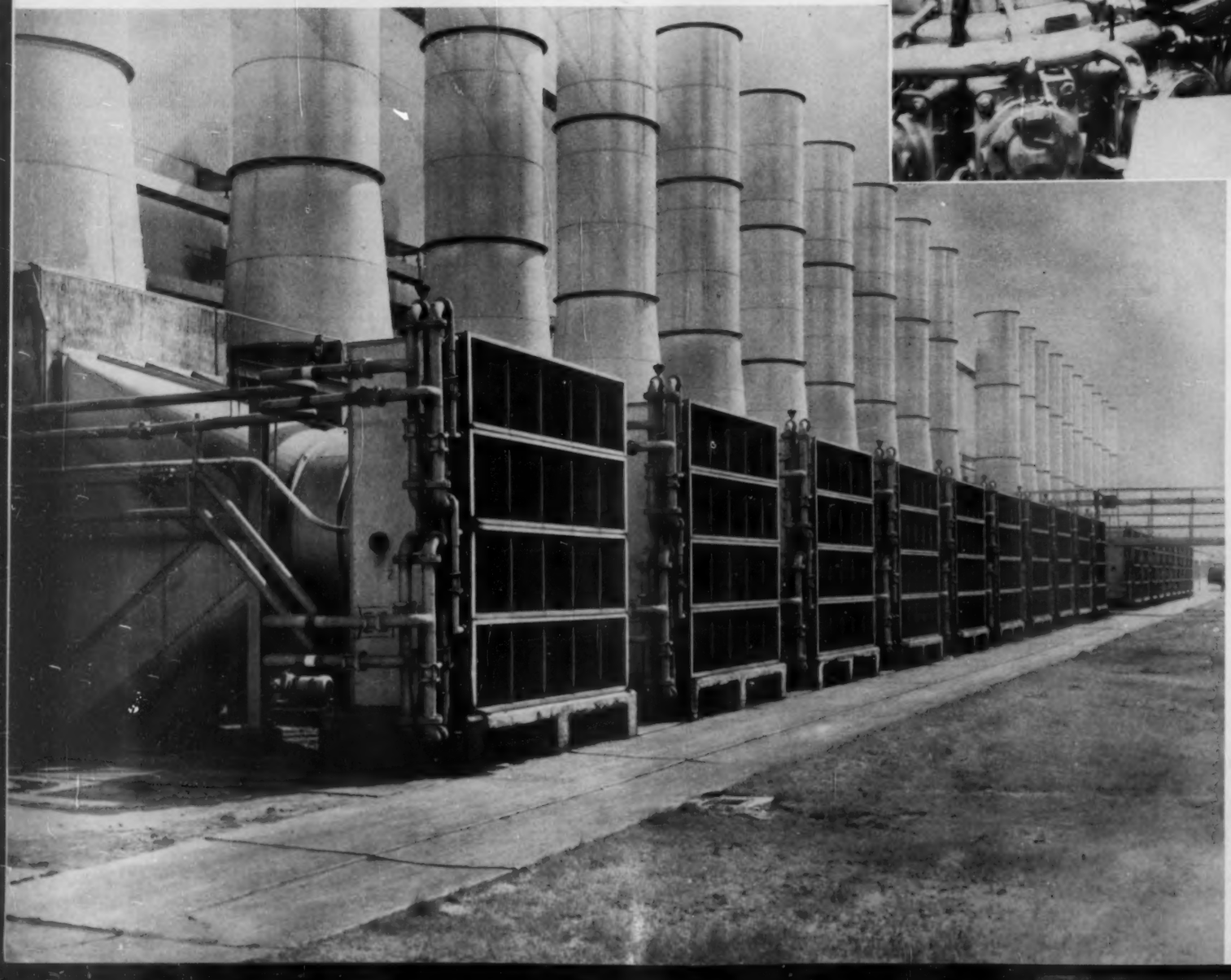
This IH TD-14A side-boom tractor had to work in some tight spots on the Somerville pipe-line job.

POINT COMFORT PLANT EXPANDED

ALUMINUM production capacity of the United States is now about ten times as great as before World War II. It more than doubled during the years 1950-1955 and will probably increase another 40 per cent by 1958. As part of its continuing expansion of aluminum production facilities, the Aluminum Company of America recently placed 26 additional Nordberg radial engine-generator units in service at its massive smelting works at Point Comfort, Texas. Twenty-two more units have been ordered for delivery beginning in Spring, 1957 to provide electrical power for the seventh pot line at Point Comfort. The new line, due for completion by January, 1958, will add 20,000 tons to the operation's installed capacity of 120,000 tons annually. This production requires the generation of well over 4,000,000 kwhs per 24 hours.

A total of 220 Nordberg radial engines with a maximum capacity of over 400,000 hp are now installed at the Point Comfort Works. It is by far the world's largest internal combustion engine power station. The newly ordered units will raise the capacity to over 470,000 hp and will be the third expansion of electric power generating facilities for the electrolytic reduction of aluminum by Alcoa at Point Comfort. The original station, completed in 1950, had 120 Nordberg engines. Seventy-four generating units were added in 1952, an additional 26 in 1955 and there will be 22 more in 1957.

Each engine-generator unit has its own stack which handles engine exhaust, generator cooling air and the air from the Trane heat exchangers, foreground, which cool both the lubricating oil and cooling water.



The latest 26 Nordberg radial engines are installed in this modern power house. Each engine has its own control panel and a central, automatic control board monitors the load on each engine. Manzel lubricators are seen on engines.

The recently installed Nordberg engines are identical to the 74 radial engines installed in 1952. They each are of the two-cycle spark ignition, gas burning type with 12 cylinders of 14 in. bore and 16 in. stroke. Rated 2125 hp at 400 rpm, they drive 1330 kw, DC 667 volt Elliott generators. All 220 engines incorporate a dual spark ignition system which permits them to efficiently burn the low cost natural gas readily available from on-shore and off-shore wells in the area. There are now six separate power houses at Point Comfort. The first three house 40 engines each; the next two, 34 each and the latest, 32, including the 26 new Radial engines. The new power building is 440 ft long in contrast to the 500 ft length of the others. With this exception it is similar to the other power house structures at Point Comfort.

The Radial engines have made an enviable operating record. As of September 1, 1956, the 220 engines, including the 26 which were recently installed, have a combined operating time of 8,100,000 hours. During this time maintenance material and parts for major overhaul have been very low.

Editor's Note: Mr. Howard Keefer, who has been Power Superintendent of the Point Comfort Plant since its inception gave a very interesting paper entitled "Maintenance Practices in a Large Internal Combustion Power Plant", at the OGP Division of ASME meeting in New Orleans, April 2-4 1956, and we quote herewith some excerpts relating to this plant's operation.

In a typical powerhouse containing 40 engines, 37 are in normal operation, one is a spare and two are down for routine maintenance. Each engine operates as a complete unit, having its independent oil and water-pump fan, heat exchanger, and other auxiliaries. Planned preventive maintenance, together with scheduled equipment outages, is a must in a plant of this type. A unit type of installation, together with the interchangeability of equipment, made it relatively simple to set up all items on a definite preventive schedule. This schedule is tailored to the actual need of the equipment; however, it naturally revolves around the major items—the engine proper and the generator. Strict adherence to the routine schedule is demanded; other work may be postponed, but the routine maintenance must continue. The present program is based on scheduled outages at definite time intervals and is divided into two phases: 1—A routine scheduled outage for minor maintenance and control equipment check; 2—A scheduled outage for major maintenance.

The first phase is set up for an electrical generator and switchgear inspection every 4 months, and a mechanical engine inspection every 12 months. A one-shift outage per unit is involved in the electrical check, and a two-shift outage per unit is involved in the mechanical check. This work is progressively scheduled so that the workmen move from one unit to the adjacent unit. The principal items checked on mechanical are as follows:

Twelve-Month Routine – Major Items – Mechanical: Change spark plugs; Check distributor points; Check spark-plug resistors; Clean carbon from exhaust ports; Replace cylinder-head water hoses; Overhaul governor; Replace gaskets as required; Check engine overspeed; Check entire ignition system using cathode-ray setup; Lubricate oil pump coupling; Lubricate heat exchanger fan motor thrust bearing; Lubricate auxiliary motor bearings (3 year intervals only); Pull inspection covers on engine and visually inspect rotating and reciprocating parts; Check instrument tubing for looseness and leaks; Check cylinder lubricator units; Tighten all flange bolts. Actual detail checking of these items is facilitated by special check-off forms used by the maintenance personnel.

The second phase of the engine maintenance program, which involves the disassembly of the engine, is based on years of operation as follows: Five-Year intervals: 1. Engine down for one-week period and unit disassembled. Maintenance men replace compression rings, check bearings for wear or distress, and perform general engine component check by checking cylinder bore, journal wear, oil passages cleanliness, water cooling deposits. 2. Engine generator exterior painted. 3. Heat exchanger and associated piping checked for corrosion and deposits that may be present.

Naturally enough, there are nonscheduled work and shutdowns, as well as special projects, tests, and the like. Such work is initiated and performed on the basis of a special trouble report form. This form is initiated by either (1) shift operating foremen, (2) staff engineers or (3) supervisors. All requests are directed to the operating superintendent who makes arrangements for equipment availability and forwards the requests to the maintenance foremen.

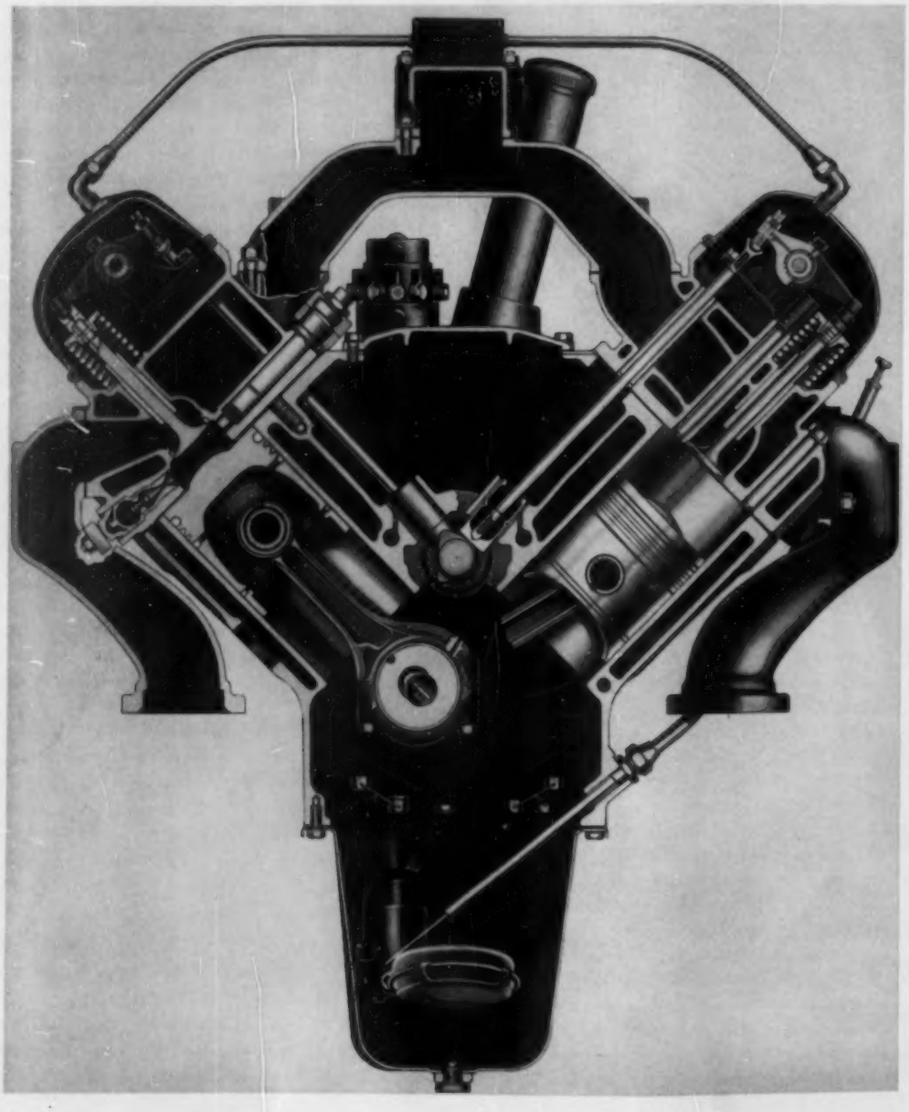
In the initial design of the power installation, every effort was made to provide for simplicity and ease of maintenance. This involved a minimum of complicated controls, maximum interchangeability of parts, adaptation of standard equipment for special purposes and increasing factor of safety in components. The co-operation of the various manufacturers was excellent in this respect. To illustrate this point the engine manufacturer provided force-feed lubrication to all moving parts of the engine, eliminating the need for periodic oiling or greasing. After 6 years of operation with maintenance schedules and procedures as outlined, some of the results are as follows: 1—Engine availability factor of 99+ per cent; 2—Load factor on engines of 100-105 per cent; 3—No power interruption due to powerhouse difficulties. The results presented in these excerpts from Mr. Keefer's report attest to the value and gains to be derived from a planned preventive-maintenance program.

THE CONTINENTAL DIESEL LINE

By ARNOLD B. NEWELL

MUSKEGON, Michigan—I came to this appealing lake port and industrial center with a view to learning more about the Continental diesel produced by one of the largest independent manufacturers of internal combustion engines in the world. This distinction is due, of course, to the tremendous output of industrial, agricultural, and transportation engines, some of which are companions to the 15 diesel models ranging from a 4-cylinder 34 hp unit of 129 cu in. piston displacement to a 6-cylinder 225 hp engine with 802 cu in. displacement. A very interesting new addition to the line is a V-8 of 603 cu in. displacement rated 182 hp at 2800 rpm. The entire line is tabulated herewith. These diesels are companion engines to the famous Red Seal engines which symbolized the best in gasoline engines back in the early history of automobile design and manufacture.

The Continental diesels are all engines of the 4-cycle type, and the maximum governed speed ranges from 1800 rpm to 2800 rpm. In each instance the numerals in the model numbers signify cu in. piston displacement. In all cases there is a family resemblance to engines burning gasoline, natural gas, LP gas and diesel fuel. For example, in the new V-8, the bore and stroke, 4-¾ x 4-¼ in. respectively and the 603 cu in. piston displacement are the same in both diesel and gasoline models, but the latter rev up to 3200 rpm governed speed for an output of 240 bare engine hp compared to 182 bare engine hp for the diesel at 2800 rpm. In the diesel we find a compression ratio of 15.8:1 while this figure for the gasoline motor of generally similar dimensions is 7.0:1. The two engines are interchangeable in all dimensions. Torque and hp characteristics of both are plotted on the graphs and dimensions are tabulated. The differences as revealed in the graphs and tables, are representative, but not essentially true of all models. They serve to show standardization and what parts are interchange-

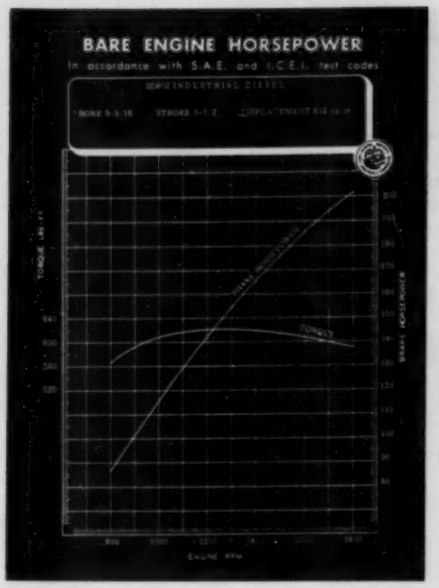


Elements of the Continental V-8 design are revealed in this cutaway view. Compact, yet accessible, this is the newest member of the celebrated Red Seal family of diesels used in marine, industrial and transportation services.

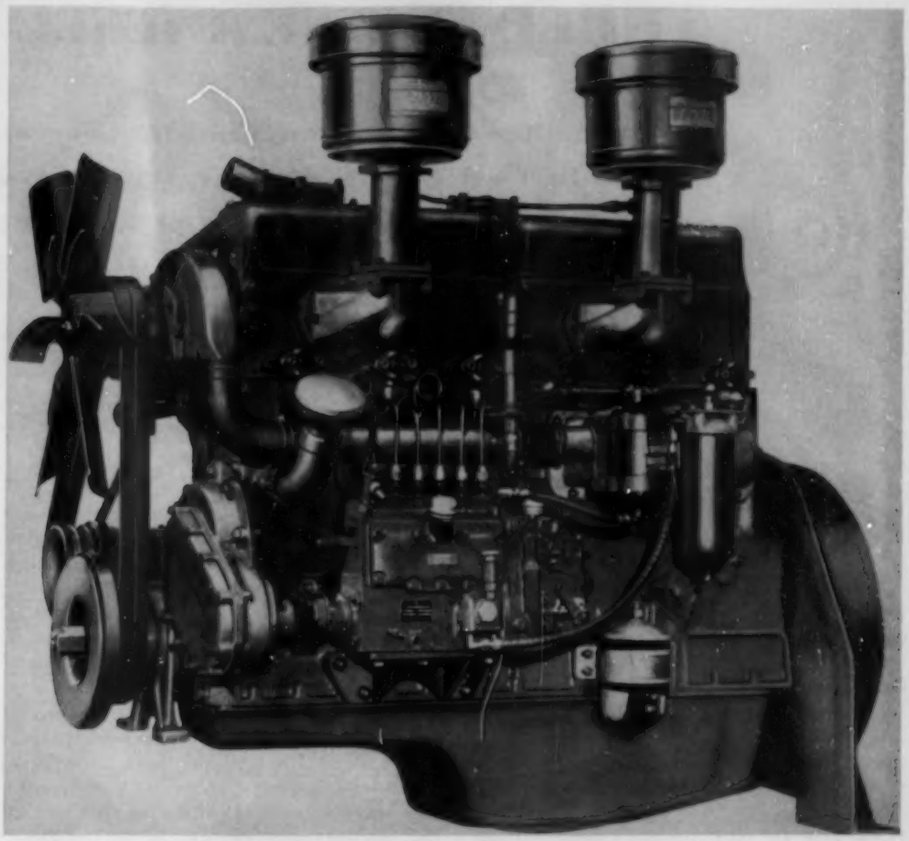
Detail Dimensions of the Continental V-8 diesel for automotive service are shown in the chart below, and illustrate well the compactness of this engine.

DETAIL DIMENSIONS

OVERHEAD MODEL	VD-8603
NUMBER of Cylinders	8
BORE and STROKE	4¾ x 4¼
DISPLACEMENT in cubic inches	603
GOVERNED R.P.M.	2800
BARE ENGINE H.P.	182
TORQUE — in Lbs. Ft. @ 1200 R.P.M.	466
COMPRESSION RATIO	15.8:1
NUMBER of Crankshaft MAIN Bearings	5
Main Bearing DIAMETER	3½
LENGTH — FRONT	1¾
LENGTH — INTERMEDIATES	1¾
LENGTH — CENTER	1¹¹⁄₁₆
LENGTH — REAR	2¼
Number of Camshaft Bushings	5
Camshaft Bushings DIAMETER and LENGTH — FRONT	2½ x 1¾
DIAMETER and LENGTH — 2nd	2½ x 1¾
DIAMETER and LENGTH — 3rd	2½ x 1¾
DIAMETER and LENGTH — 4th	2½ x 1¾
DIAMETER and LENGTH — REAR	2 x 1
Connecting Rod LENGTH (center to center)	8⅞
Bearing DIAMETER	3⅛
Bearing LENGTH	1¾
Piston LENGTH	5⅞
Pin Bushing I.D.	1½
Pin Bushing LENGTH (in rod)	1¾
Ring NUMBER	3
WIDTH — Compression (2)	⅛
WIDTH — Oil Control (1)	¼
WIDTH — Oil Control (1)	¼
Valves - INTAKE - DIAMETER - HEAD	2¹⁄₁₆
DIAMETER - THROAT	1¹¹⁄₁₆
LIFT	.5667
Seat ANGLE	45
Valves - EXHAUST - DIAMETER - HEAD	1¹⁄₁₆
DIAMETER - THROAT (Insert)	1½
LIFT	.5667
Seat ANGLE	45
WEIGHT - Bare ENGINE	1525



Performance curves for the Continental six cylinder Model SD 802 industrial diesel. This engine has heavy duty characteristics typical of Continental diesels as a whole.



The Continental Model SD 802 six-in-line is typical of the many diesels produced by Continental Motors Corporation. Clean-cut and sturdy, it performs well in tough service. Note American Bosch fuel injection system, Fram filter, and dual Air Maze oil bath air cleaners.

able between the diesel and the gasoline engine types. The rest of my observations will be confined strictly to the diesel as such.

All of the diesels are set up for transporation, agricultural, industrial and marine services, generating sets being looked upon as industrial engines. The marine line is marketed as the Graymarine diesel, and all the others are merchandised as Continentals. Briefly the engine consists of a solid block cast in one piece to carry the main bearings, crankshaft, con-rod and piston assembly. The cylinder head is a single casting (on the larger engines, a two piece casting), valves in the head are push rod and rocker operated from a camshaft driven by a helical gear train.

An interesting and important design element is the block split below the center line of the crankshaft to make it more rigid and less subject to distortion in service. Line reaming of the main bearings in place in the block is standard practice. An aligning bar less than ½ thousandth in. under the low limit of the crankshaft bores is inserted to assure perfect alignment. The precision bearings are steel backed tri-metal bearings. The bearing caps are doweled to position and held with cap screws. The forged crankshafts are counterweighted and tocco hardened, with nitrided shafts available. Con-rods are drop forgings carrying precision bearings at bottom ends the same as the mains. Bronze backed bushings are used in the top ends. Pistons are of aluminum alloy, treated for improved break in. In general, there are five rings per piston and the top one is chrome plated. Camshafts are heat treated drop forgings. In the new v-type engine only one camshaft operates the valves for both banks of cylinders. It is located snugly down in the V of the cylinder block. Another interesting element of the v-type engine is water circulation to the very bottom of the cylinders, within the jacketed area.

As we all know, the combustion system employed by the various engine manufacturers is an element of considerable pride to the designers. In the Continental Diesel the trade name is Cushioned Power. It is designed to flatten out the peak of combustion pressure and in this way contributes to smooth operation. When the piston is at top center a 2-compartment combustion chamber is formed. There is an energy cell at one side into which the air is compressed. When fuel injection and initial combustion occur and the piston starts down, air in the cell surges out around the fuel spray producing a swirl that results in a homogenous mixture which tends to surge back into and then again out of the energy cell. The general effect is a dampening of high pressure waves, good combustion and smooth running. The fuel injection system is optional: either American Bosch or Roosa-Master is available.

These engines conform to current practice in good diesel design. They are fitted with a conventional type of oil pan, lube oil strainer and pump which serves the pressure lubricating system of the entire engine. The oil is cooled with a shell and tube type heat exchanger. An effective oil filter is used. A suitable air filter is employed and the fuel passes through a two or three-stage filter. Vibration dampener is also available. A 24 volt starting system is used on most of the engines and provision is made for hand cranking for timing and service work. To make starting easier in cold weather an electric manifold heater or ether capsule arrangement is available. Hook-ups in general are all to SAE standards. My impression is that the arrangement of water cooling pumps, cooling fans in services where needed are in no way unusual but they are up to good current practices.

For some automotive commercial services the engines are equipped with v-belt driven generators of large capacity and an air compressor for the air brakes. This works out as a neat arrangement at the front of the engine, taking power from a pulley on the crankshaft without a material increase on overall length. On the new V-8 there is a compact air inlet arrangement of manifolding serving both banks of cylinders through a central air filter. A matter of passing interest is the fact that the big SD802 has two air filters, one serving each in-line set of three cylinders. The transportation engines are complete units ready for installation in numerous types of vehicles. For emergency generating sets and various industrial applications the engine assembly is sold to the manufacturers who equip it to the customer requirement for generator, pump or other driven element in a complete power unit set.

THREE-IN-ONE DIESEL DREDGE

Versatile New Dredge, Powered with General Motors Diesels, Can Be Used As Either A Dust Pan Excavating Machine Or Cutterhead Dredge And Is Self Propelled, Making It Actually Three Machines In One.

By ARNOLD B. NEWELL

BALTIMORE, MARYLAND—What amounts to three vessels in one has been designed and built by the Ellicott Machine Corporation of this busy shipbuilding center. This mammoth vessel is a dredge of extraordinary versatility with its adaptation for use as either a dust pan excavating machine or as a cutterhead dredge and it is therefore two machines in one. However, it is self propelled and consequently can be classified as a river vessel with all of the essential features for river navigation, thus freeing it of dependence upon towboats to move it from one job to another.

It was built for the Colombian Government for use in a long range program of Magdalena River improvement and is named *M.O.P. DH-6 Adenavi*. The hull of twin tunnel stern and scow bow shape is 200 ft long, 44 ft wide and 7½ ft deep. It is equipped with four diesels for various services, totaling approximately 2000 hp. The engines are all made by General Motors. The largest one is a 1200 hp 12-278A operating at 750 rpm. This engine operates the main dredge pump through the medium of a Falk 2.77:1 gear and Airflex coupling. Two General Electric generators for operation of the two 500 hp propulsion motors are directly connected to the main engine so that either the pump or the propulsion system can be driven by the same engine. The main generating set which supplies the power to operate the various items of equipment aboard, including one jet pump is a model 8-268A GM Cleveland diesel directly connected to a 300 kw, 440 volt, GE 60 cycle generator. Next in point of power is a twin set of G-M 6-71 diesels driving one of the jet pumps and the fourth power element is another 6-71 driving a 60 kw Delco ac generator for stand-by service. Each of these engines is cooled by a separate closed system using Ross heat exchangers. They are silenced by Maxim silencers and the separate oil purification systems are served by Briggs filters. Thus we observe a high degree of standardization of power equipment and undivided responsibility in each general grouping. Sufficient fuel is carried for 10 working days. The electric propulsion system is conventional in all respects including the pilothouse controls. The GE motors drive a pair of 4-blade Columbian Bronze propellers. A Sperry hydraulic steering system is employed in connection with two rudders only, as the dredge is not a towboat and flanking with rudders ahead of propellers is not needed.

The dredging equipment is all to Ellicott design and manufacture which is to be expected for this company is the only one in this country devoted wholly to dredge building. They have been building dredges exclusively for the past 52 years and in the main office 211 plaques are mounted on a board, one for each dredge built. However, many parts for dredges other than their own have been made by this remarkable company. For over a quarter of a century they have been powering their products with diesel engines, steam having vanished from the picture in the 20s. It is therefore not surprising that we find this big earth moving machine extremely interesting. It features highly individual design characteristics, making it the first of its kind successfully engineered.

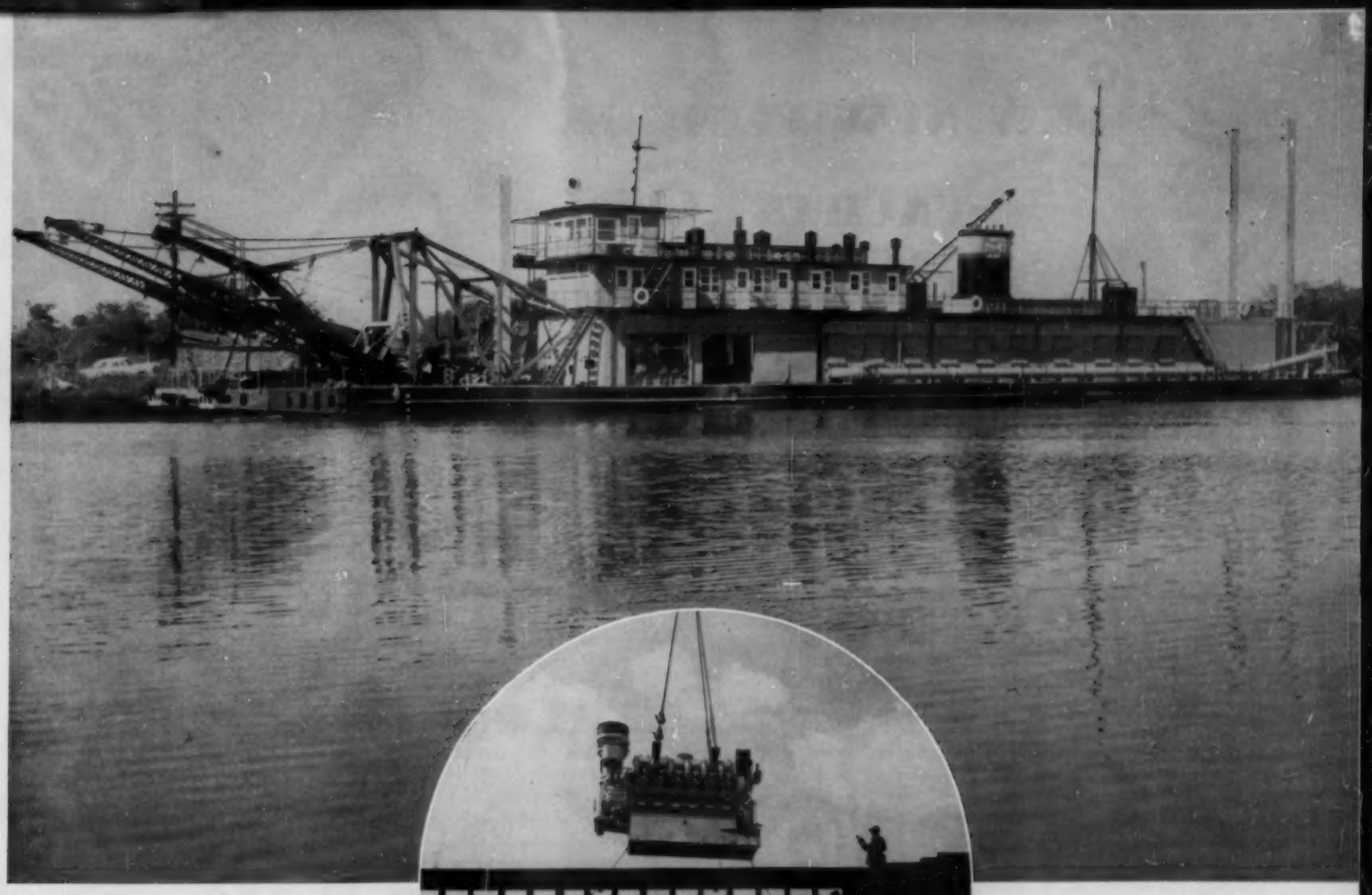
Chief among its unique design qualities is adaptation for use as both a dustpan and cutterhead dredge. With this interchangeable dredging machinery design, the *Adenavi* is able to take earth materials having degrees of density from free-flowing silt to compact clay and coarse gravel. It has a rated output when used as a dustpan dredge of approximately 2000 cu yds and as a cutterhead dredge of approximately 850 cu yds of dredged material per hour maximum. The so-called dustpan dredge is equipped with a wide suction head similar in shape to the familiar household vacuum cleaner and is fitted with a system of hydraulic jets. With this attachment it can dig to a depth of 26 ft and make a longitudinal cut or trench approximately 30 ft wide and 2000 ft long.

A system for supplying water to the jetting nozzles is used with dustpan operation. There are two large centrifugal pumps, one electric motor driven and the other G-M diesel driven. These are interconnected by suitable piping and valves so that either pump may be used independently or both pumps used either in parallel or in series operation, depending upon the nature of the materials to be dredged. The jetting pumps take water from overboard and discharge it through jetting nozzles in dustpan head at a pressure most suitable for the materials to be dredged. The suction pipe underneath the dustpan sucks up the water laden with solids and passes it through the dredging pump system.

To dig clay and compacted gravel or to cut channels through land areas, the dredge is changed to cutterhead type by switching the dustpan attachment for cutter. This can be accomplished with minimum of time and effort due to the special design of the dredging ladder. As a cutterhead dredge it has a digging depth of 33 ft. In addition to two stern spuds which are used when dredging as a cutterhead dredge, the *Adenavi* has a third spud near the bow to hold position in the cut when working as a dustpan dredge. The aft spuds are 28 in. square section while the forward spud is 24 in. square section.

With the standard cutterhead the cut is made by swinging the dredge from side to side. When working as a dustpan dredging is performed by pulling the dredge ahead on head lines anchored 2000 to 3000 ft in front. Winches with minutely variable speed controls advance the dredge into the cut. It can pump ashore through pipe lines or discharge loose materials directly into the river where they will be carried downstream by the current. Because the Magdalena is cluttered with small islands, and has an irregular shore line, usual movement of a floating pipe line would be obstructed. Therefore, a newly designed swivel discharge pipe has been devised, permitting the dredge to work around the obstruction.

Equipped for 24-hour operation with a fuel capacity for 10 working days between fueling, a crew nucleus of 6 men will be accommodated in comfortable living quarters aboard. They include sleeping facilities and a modern galley with refrigerating equipment. For the working crew of about 60 men a floating hotel accompanies the dredge. The *Adenavi* is the fifth dredge built by Ellicott for the Republic of Colombia for diversified dredging projects to improve the nation's waterways and for land reclamation. This new dredge will be used primarily for the improvement and maintenance of the Magdalena River, chief navigational artery for the South American republic. It is the biggest river in Colombia and has at present approximately 600 navigable miles. It is the country's chief avenue of import and export trade. Numerous fingers of land jut out from the shore and the river runs an erratic course. Navigation is further hampered by small islands and sand bars. During the dry season the water is too shallow to float ships having any appreciable draft. This new dredge will improve the water level to permit year-round navigation.



Lowering one of the 1200 hp GM Cleveland diesels into the big Ellicott dredge.

The main pump and the propulsion generators are driven by this 1200 hp GM diesel. Note Marquette governors on each Cleveland GM diesel.

A FEW NEW FLORIDA YACHTS

By ED DENNIS

THE following are brief descriptions of important recent yacht developments in Florida which feature the latest in diesels for maximum propulsion power efficiency.

Christened the *Janice*, it is sixty four feet of modern comfort afloat plus high speed. That is the best description of this beautiful yacht skippered by Knut Swanson of Fort Lauderdale, Florida. The *Janice* is a Chris-Craft cruiser, built to the special specifications that were the desire of Mr. J. E. Anderson of the J. E. Anderson Construction Company, Chicago, Ill. and recently repowered with two of the new General Motors turbopower series 71 diesel engines.

Of special interest to the yachting fraternity is that these newly installed Detroit Diesel turbopower diesel engines are basic 6-71 units having a bore and stroke of 4¼x5 in. and a displacement of 425.6 cu in. and retaining the uniflow blower scavenging plus the other series 71 features. The big change is that 90 mm injectors are used and a turbocharger has been added to produce more horsepower. The diesels drive two Equipoise 26-x28 three blade propellers through GM 2.5:1 hydraulic reduction gears to give the engines 300 hp at 2400 rpm and the ship a very comfortable cruising speed of 15½ knots.

Ample auxiliary power is provided by a 4 cyl. model DIX 4D 21 hp Hercules diesel engine which drives a 15 kw United States Motors generating plant. Mr. Anderson, with the experience of 14 other pleasure crafts, has placed in the *Janice* the accent on uncluttered and comfortable living plus going power. Besides the owner's state room, which contains twin beds and Mr. and Mrs. Closets, the craft has separate quarters for 3 crew members, dining nook and galley facilities, a large salon, a guest state room with twin beds and on the port side is a pullman style compartment for two. Ample space has been provided for outdoor living in the large cockpit and deck room.

The *Snuffy*, a distinguished 60 ft yacht, was built, with magnificent styling and seaworthiness, by the Huckins Yacht Corp. in Jacksonville, Florida for Mr. C. G. Fuller. Accommodations besides the roomy salon are 3 double staterooms, crew quarters, dining and galley facilities and plenty of open cockpit and deck space. It is powered with a pair of modified model NRTM-600 Cummins diesel engines which were engineered and supplied by Cummins Diesel Engines of Florida. The engines are rated 300 hp at 2100 rpm and instead of using the regular roots type supercharger, the modification plans called for the installation of an Elliott turbocharger. Another specification called for 86 in. overall length. This 6 cylinder Cummins diesel has a bore of 5⅛ in. and a stroke of 6 in. with a piston displacement of 743 cu in. Driving through two Capitol HYCD 200 hydraulic reverse gears and Huckins V drives, *Snuffy*, cruises at 22 knots with a top speed of about 27 mph.

A sister Huckins built ship, the 64 ft *Linwood*, is also powered with two NRTM 600 Cummins

The *Janice* powered with two turbocharged 6-71 General Motors diesels rated 300 hp each at 2400 rpm, enroute to the Bahia Mar Yacht Club Basin in Ft. Lauderdale, Florida. This is the first installation of these new turbocharged diesels in a pleasure craft in Florida.

The 60 ft yacht *Snuffy*, during her trial runs outside of Jacksonville, Florida. Built for C. G. Fuller by Huckins Yacht Corp. at Jacksonville, Florida, she is powered with two NRTM 600 turbocharged Cummins diesel engines to give her a top speed of 27 mph.

The *Norseman*, a 41x12 ft sportsfisherman was built by Chris Boat Works in Miami and is powered with a pair of 85 hp Model 6DAR273 Buda marine diesels.

diesel engines. Another popular Huckins built pleasure craft is the 64 ft *Susabelle B*, built for Mr. Walter L. Barker chairman of the board, Improved Machinery Inc. of Nashua, New Hampshire. She is powered with two supercharged model NHRMS 600 Cummins diesel engines.

The *Norseman* is a new 41 ft sports fisherman recently launched by Chris Boat Works on the Miami River in Miami, Florida. This craft is a combination of a good sturdy sea boat for fishing and a comfortable cruising yacht for the family. There are sleeping accommodations for 4 persons, combination open end lounge and galley along with plenty of open cockpit and a flying bridge. The *Norseman* is powered with two model 6 DAR 273 Buda diesel engines which were supplied and engineered by the J. Frank Knorr Co. in Miami,

The 64 ft yacht *Linwood* built for J. Ruppert Schalk of New York and Ft. Lauderdale, is powered with two 300 hp Cummins diesel engines.

Florida. These are 6 cyl. 4 cycle diesels with a bore and stroke of 3¾ in. by 4⅛ in. and a displacement of 273 cu in. Turning 22x20 Equipoise propellers through 2.56:1 Capitol hydraulic reduction gears the *Norseman* has a cruising speed of 14 mph. These Buda diesels have an 85 hp rating.

Another General Motors diesel that is gaining in popularity with the Florida yachtsmen is the small series 51 diesel engine. Valveless, it indicates a trend toward compactness in small, light weight, high speed marine diesels. The 4-51 marine diesel is rated 87 shp at 3000 rpm and weighs but 1300 lbs and has a bore and stroke of 4.1x4.1 in. Some of the recent installations of these small G.M. diesels include the twin screw 38 ft sportsfisherman *Striper* built by Chris Boat Yard, Miami, for Mr. Shanley F. Corcoran of Stoughton, Mass. On the west coast of Florida, the General Engine & Equipment Co. of Tampa, installed one in the 33 ft party fishing boat, *Hazel C* of Dunedin.

DRILLING VESSEL *DELTA OFFSHORE NO. 1*

Modern Offshore Drilling Vessel Features Alco Diesel Electric Units Providing Power For The Drilling Machinery.

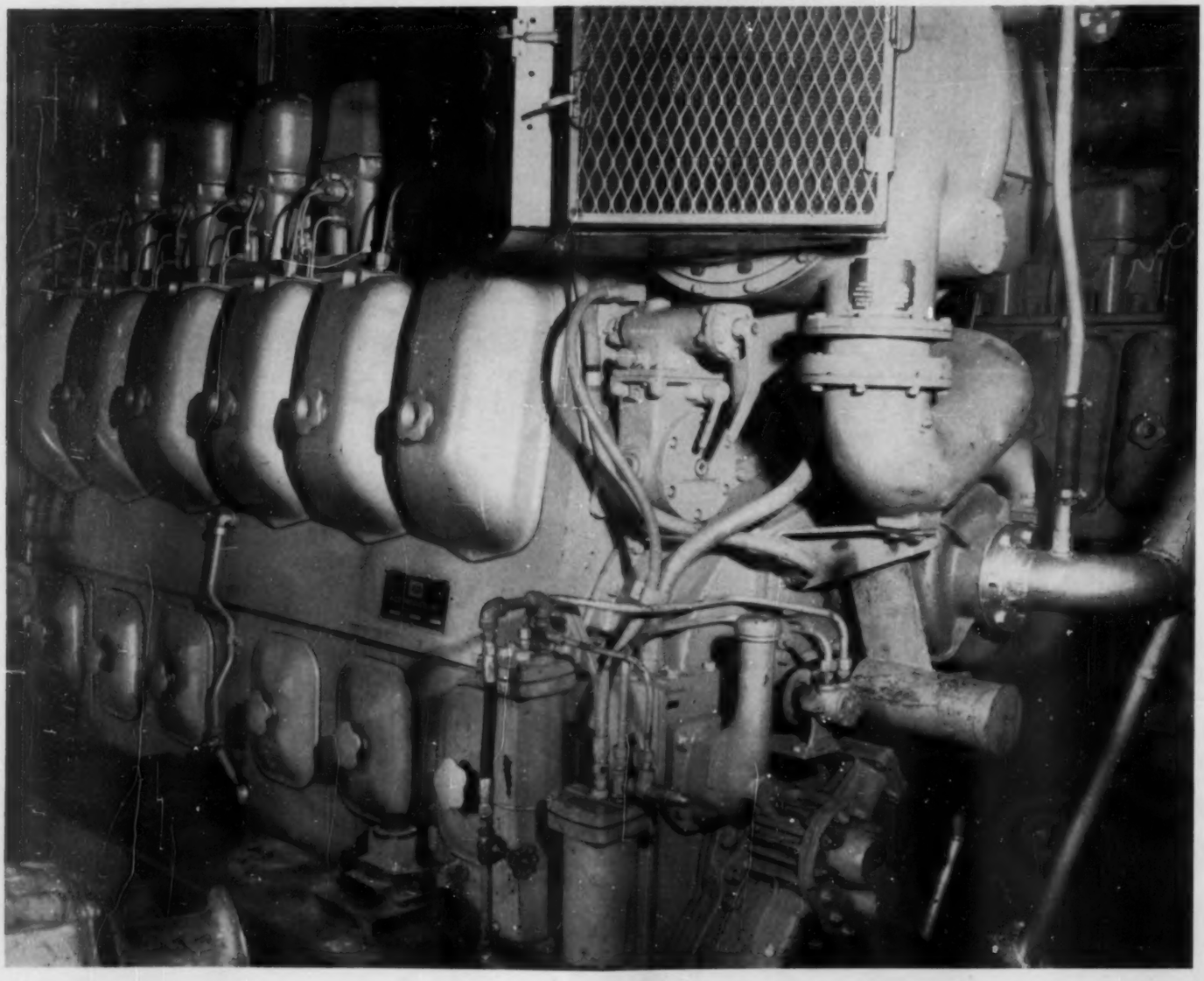
By DOUGLAS SHEARING

ON the 29th of October 1956, New Orleans witnessed the christening of another Offshore Drilling Vessel at the Avondale Marine Ways. This outstanding unit, known as *Delta Offshore No. 1*, was designed by Friede & Goldman, Inc., Naval Architects and Marine Engineers, well known as pioneer designers of offshore drilling vessels. It is the fourth mobile drilling vessel of Friede & Goldman design to be built by Avondale for various clients, including the California Company S-55. The *Delta Offshore No. 1* was christened in a colorful ceremony by Mrs. Sam Israel, Jr., wife of a Company Director, in the presence of a large number of friends, civic officials, oil industry and drilling company executives, American Bureau of Shipping personnel and Naval Officers. The Chairman of the Board of the Delta Offshore Drilling Company, Inc. of New Orleans is Mr. Alvin H. Howard. The President is Mr. D. E. Vassar. The vessel is quite unique in that it was designed, financed, built and is owned in New Orleans.

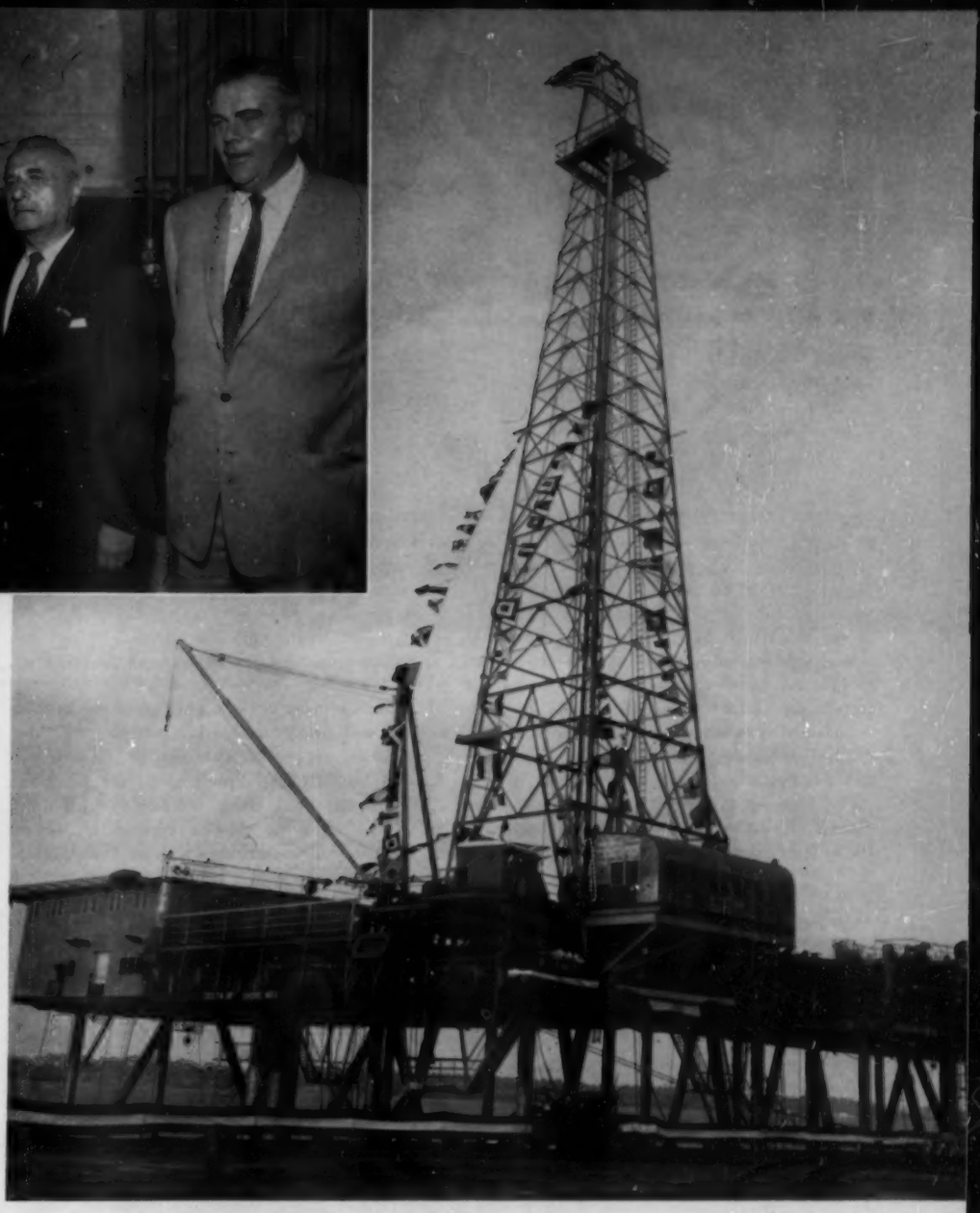
Designed to drill wells 20,000 ft deep, in water up to 25 ft deep in the Gulf of Mexico, the *Delta Offshore No. 1* is one of the latest, most modern and efficient offshore units to join the large and rapidly growing fleet of mobile submersible vessels drilling in the Gulf of Mexico. In addition to other distinctive features, she is among the first mobile offshore units whose drilling machinery is entirely diesel electric driven, with Alco engines supplying energy to generators and motors. The drilling machinery, supplied by the Mid-Continent Supply Company consists of a 1,220 unit rig drawworks, Ideco 27½ rotary table and two Emsco D-700 mud pumps. Lee C. Moore built the 140 ft x 30 ft derrick and galvanized steel substructure.

The vessel is of the self-stabilizing submersible type best suited for the particular soil conditions found in those locations and depths in which it will work. It is stabilized by four recessed pontoons

View of one of the three Alco diesels that make up the main power plant on the drilling vessel. One Alco diesel drives two 500 kw dc generators and the other two engines each drive two 500 kw dc generators and one 250 kw ac generator. These are Alco's new 6-cylinder model 251-B diesels which develop 850 hp at 1,000 rpm.



Present at the dedication of *Delta Offshore No. 1* were, left to right, Jerome L. Goldman of Friede & Goldman, D. E. Vassar, President of Delta Offshore Drilling Company, Comdr. V. M. Friede of Friede & Goldman, and Alvin Howard, Delta Chairman of the Board.



Delta Offshore No. 1 is designed to drill wells 20,000 ft deep in water up to 25 ft deep in the Gulf of Mexico. Her drilling machinery is entirely diesel electric driven, with Alco engines supplying energy to generators and motors.

operated hydraulically by the mud pumps when the hull is being lowered or raised. The drilling and machinery decks are supported on fixed columns, secured to the hull. Adjustable fenders, supported by vertical steel bridge-type wire cables, as previously developed by the naval architects for mobile offshore units, will protect the structure and the tugs, supply ships or barges which moor alongside. Four stockless anchors served by two Clyde winches are provided for mooring and maneuvering at site. Fuel oil, drilling water and potable water are stored in the submersible hull. A hinged, rake shaped bow section for efficient towing is fitted to the hull, which is of the full anti-scouring design, with skirts fitted around the entire periphery as found by experience to be very satisfactory for such service on the Gulf bottom. Drill pipe, casing, mud and other materials are handled by two five-ton stiff leg derrick cranes, one starboard and one port.

Principal Vessel Characteristics

Length overall	156 ft
Beam molded	90 ft
Depth of hull	11 ft
Stabilizing of pontoons—4	41 ft-6 in. x 25 ft-6 in. x 3 ft
Loaded draft under tow	6 ft-6 in.
Slot length and width	35 ft-3 in. x 12 ft-6 in.

While its total cost rigged up ready to drill was less than $2,000,000, *Delta Offshore No. 1* is built of the finest materials, fitted with the best equipment, and is complete and finished to a fine degree. The deck house and helicopter deck are of plate aluminum; the main supporting columns and structurals are of U. S. Steel Corporation's high tensile alloy Tri-Ten steel; air conditioned crew quarters, offices, dining salon and recreation room (with television) for 32 men are provided; a Schlumberger well surveying and logging unit and a Halliburton cementing unit have been provided; a Mecco vapor-compression distillation unit provides 7,200 gallons of fresh potable and drilling water per day; and a 60 kw ac General Motors diesel generator set has been provided for starting up from cold.

The main power plant consists of three Alco Products Company diesel electric generator units, each consisting of the diesel prime mover and the following driven generators: a.—Two 500 kw dc generators, set No. 1. b.—Two 500 kw dc generators and one 250 kw 450 volt 3 phase 60 cycle ac generator, set No. 2. c.—One 500 kw dc generator and one 250 kw 450 volt 3 phase 60 cycle ac generator, set No. 3. Each of the above units drives a 50 kw 120 volt dc generator for motor excitation and power to the motor ventilating blowers. The main dc motors driving drilling machinery are shunt wound, speed being obtained by the Alco variable voltage control system. All electrical equipment and wiring is to A.I.E.E. requirements.

In accordance with the desires of the Delta Offshore Drilling Company, Inc. the greatest possible attention has been given by the Naval Architects toward obtaining the utmost reliability and safety. The *Delta Offshore No. 1* was built to special classification and inspection of the American Bureau of Shipping. She was documented and admeasured by the Bureau of Customs. Applicable regulations of the U. S. Coast Guard and other governmental agencies were followed in the design and construction.

ADVANCE PAYMENT IN BLOOD, SWEARS AND TEARS!

Road Building to Handle Automotive Traffic Finally Starting—Biggest Dirt Moving Job on Highway 40.

By F. HAL HIGGINS

NORTHERN California's Bay area is finally getting its over-due modern highways long after they have been paid for in blood, swears and tears. Out from Richmond north across the Carquinez Straits at Crockett can be seen the fleets of big diesel road building and bridge construction equipment battling against time and nature to give the heavy auto, truck and bus traffic a freeway big and safe enough to handle the growing load by completion time two years from now. Contracts totalling $33,638,458 have been awarded to six successful bidders to build a stretch of 12½ miles between Richmond and the Carquinez Straits. The entire job should be completed with the quarter-century-old bottleneck removed to free the motor traffic from paying for a modern highway it needed but couldn't get in spite of the high price being paid in time, lives and automotive fuel and equipment. It is a tribute to the diesel-equipped bid winners that they shaved the State Highway Department's cost estimates by over two million dollars for a solid saving to the taxpayers.

There are many of the world's big names in highway and bridge construction on the job, from Jefferson Avenue in Richmond to the new parallel bridge being thrown across the Carquinez Straits 12.5 miles north, building this important freeway out of the east San Francisco Bay area on Highway 40. Frederickson & Watson and Morrison & Knudsen built the 4.8 miles being completed out of Richmond at a cost of $5,400,000. The writer can recall both in big road and dam jobs over the past thirty years as they gathered know-how and experience in big and little jobs in the West. Morrison & Knudsen were well known over the West before World War II. Frederickson & Watson came up from the ranks in road building in Northern California over the past quarter century.

Not only is there a new bridge being built at Crockett across the Carquinez Strait to parallel the old bridge in this Highway 40 link, but there will be many new bridges constructed between Richmond and Crockett where the new 6-lane highway will jump across highways and deep drops between hills. One hill being cut down back of Rodeo is the biggest cut in highway building in the U. S. More dirt to be moved than on any job since the Panama Canal, is the way it is put by State Highway engineers. There are four contracts at the bridge end of the dozen miles of road and bridge building. The United States Steel Corporation won the bid on superstructure construction with $9,489,126. The sub-structure went to a combination of a famous old firm dating back to Civil War Confederate railroad days that is joined with a Pacific Coast firm, Mason & Hanger-Silas Mason Co., Inc. & F. S. Rolandi, Jr., Inc., at $5,454,694.16. The bridge approaches are being constructed by Peter Kiewit Sons Co., who, DIESEL PROGRESS readers will recall, is the firm that first brought Euclids to the West Coast when they appeared on Parker Dam, on the Arizona-California border about 1935 to start a revolution in high-speed scrapers on rubber instead of tracks.

D. P. readers will also recall Kiewit on the big canal project that carries irrigation water southwest from the east side of the San Joaquin Valley to within a few miles of Bakersfield in a project that saved much of the area from going back to the desert. Kiewit's winning bid for bridge approaches in Crockett and Valona and an interchange structure was $4,661,462. Hooking up with the Kiewit job in the super-duper dirt-shoving job of all time since the Panama Canal, is the 2.9 miles of U.S. 40 being realigned to bypass Rodeo between Hercules and Crockett for grading and

Cummins diesel in Mack truck being unloaded by one of Silas Mason's diesel cranes in the construction of the new parallel Carquinez Straits bridge on Highway 40 freeway. This Link-Belt crane is powered by a Cat diesel engine.

Truck crane on the Ferry-Crow job: Peterbilt truck with Cummins diesel; a start of the trend to heavier trucks for crane with diesel instead of gas engines for power.

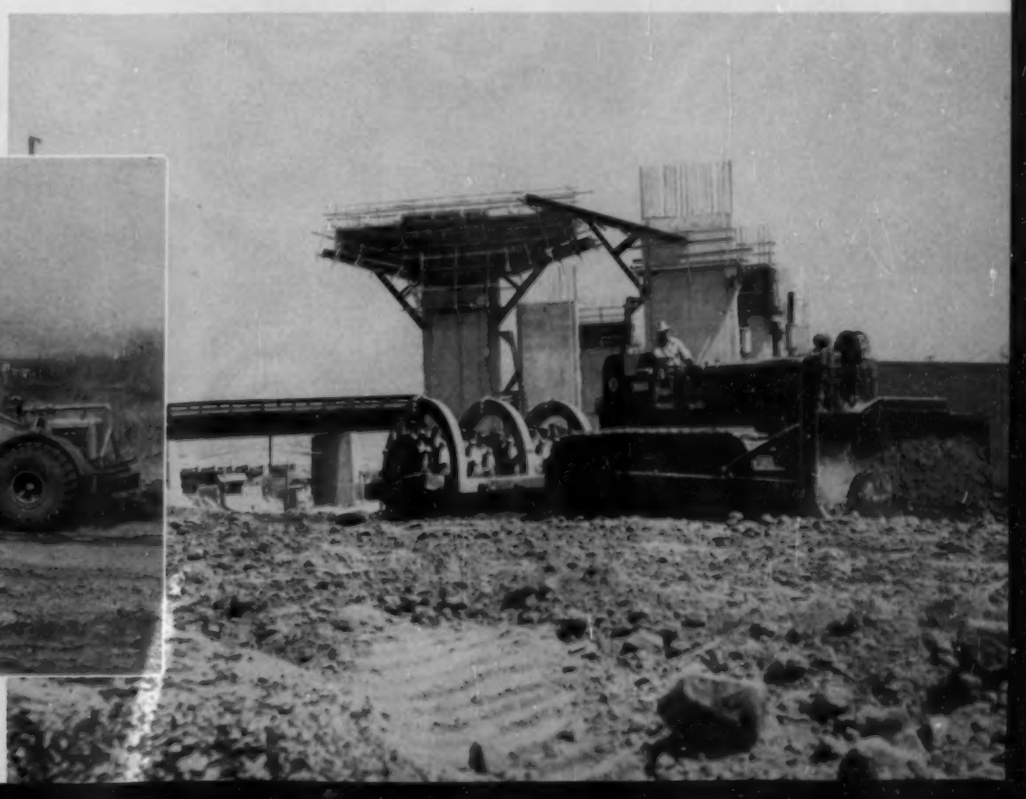
One of McCammon & Wunderlich's 10 TD24 International tractors at work hauling pull scraper on the big Highway 40 Freeway near Hercules, California.

paving six lanes and the construction of five bridges, three of steel girder and two of reinforced concrete. Ferry Bros., John M. Ferry, Peter L. Ferry & Son, and L. A. & R. S. Crow is the combination of firms from Southern California that won this bid and took the bid and breath away from old timers in the road building game in Northern California. Their bid was $7,098,690.20, nearly three quarters of a million dollars under the State Highway Department estimate. Thus over 26 million dollars is being spent in a stretch of a little over three miles, or over 8 million dollars a mile.

Three half-day visits over the operations reveal the rugged American spirit at its competitive best. Not only are managements and methods being tested for the survival of the fittest, but the tools and machines and their manufacturers, dealers and operators are all on trial. They have won their spot in dirt-moving history by getting the call for a place on the job. Service with the equipment chosen by the contractor is all important. He has a job to do in a certain number of days, minus those days when weather stops the job. Most of these contractors are working two shifts of 7 hours each. They figure the 7-hour stretch is better for operators than the longer 10-hour shifts such as found at Nacimiento Dam where they are battling to raise their dam above the danger height from fall rains in case another month, such as came late December, 1955, should hit them. Operators draw $3.20 an hour, or $22.40 a day.

With Standard of California, Union, Shell tank farms, refineries and distributors within a short distance of this big freeway job, service in oil field products is so efficient it is not noticed, except as one notes their colors on drums as he passes service shops and grease wagons parked at convenient spots for servicing equipment on the job. One notes, too, some of the accessories stocked in the field shops of the contractors: Air-Maze, Winslow, Wix, Nugent, Purolator filters and cleaners, Delco-Remy generators, Woodward governors, Harrison radiators, Twin-Disc clutches, to name a few.

One of McCammon & Wunderlich's 10 International TD24's doing a double act of spreading the fill and sheep-foot roll-tamping it around the piers where the new freeway of Highway 40 jumps across another highway near Hercules, Calif.



Southwest water wagon taking on its load of 5,000 gallons. Note it has auxiliary Red Seal Continental engine on rear to throw the water over a wide swath as it operates over fill and roadways to and from fill. Tank is pulled by a Euclid with GM diesel.

M/V *BETTY MORAN*

By A. D. BURROUGHS

THE big white M has long been a familiar sight on the stacks of Moran harbor and ocean tugs throughout the world. Now the proud emblem is worn by the *Betty Moran,* the first new river towboat for Moran Inland Waterways Corporation's expanding inland operations. Designed and built by the St. Louis Shipbuilding & Steel Co., the *Betty Moran* is now in the oil trade pushing barges for the Texas Company between ports on the Ohio River.

The 2160 hp twin screw towboat was christened by Mrs. Richard P. Danis, daughter of Rear Admiral Edmond J. Moran, President of the parent company, Moran Towing Corporation. A party of Moran officials and friends from New York were in St. Louis for the traditional champagne bottle-breaking ceremony.

The hull of the *Betty Moran* is 124 ft x 30 ft x 10 ft 6 in. with a draft of 7 ft 6 in. The hull is of heavy construction framed longitudinally and transversely, and all bulkheads are of ⅜ in. plating with vertical and horizontal stiffeners. The bow is a modified model type; the stern has long easy lines leading to two specially designed Kort Nozzles, stainless steel propellers and Contraguide rudders. The hull and machinery of the *Betty Moran* were built to the highest classification for river service of the American Bureau of Shipping. Propulsion is provided by two General Motors 12-567 diesel engines each rated at 1080 hp at 750 rpm. The 6 ft 6 in. diameter stainless steel propellers turn in Kort Nozzles at 250 rpm through 3:1 ratio Falk reverse reduction gears with Airflex clutches. Goodrich Cutless rubber bearings are provided for the stern struts. Control from the pilot house of the main engines and clutches is accomplished with Westinghouse Air Brake Pneumatic controls.

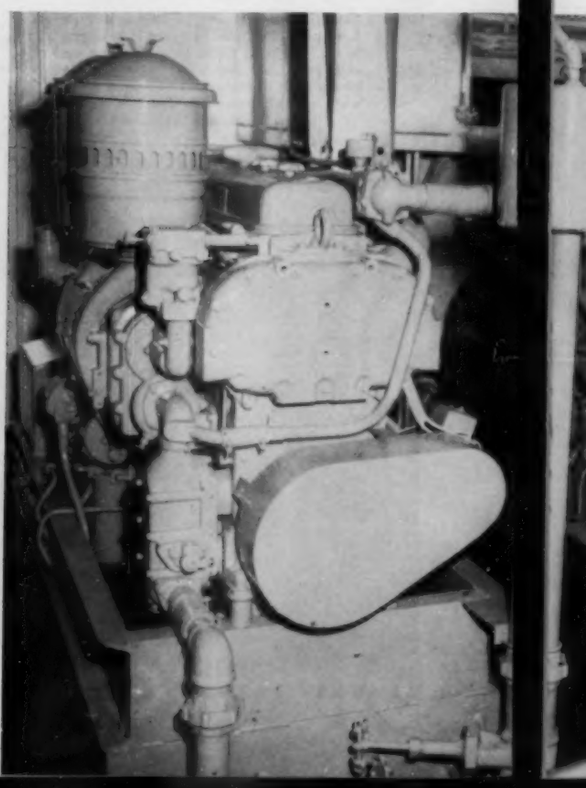
Cooling of the main engines and generators is accomplished by circulating the jacket water through the highly efficient St. Louis Shipbuilding & Steel Co. closed duct skin cooling system. Electric power is provided by two 60 kw 3 phase, 60 cycle, 220 volt ac generators driven by General Motors 6-71 diesels. A dead front switchboard furnished by Central Electric Co. provides generator control and distribution of power. A 100 gpm Weinman Fire Pump, driven by a 7½ hp Century Electric motor, supplies three hose outlets. Two Quincy #D325 Air Compressors, driven by 5 hp Century Electric motors furnish air for engine starting, clutches, controls, capstan, winches and air whistle. A ¾ hp motor driven Goulds Bilge Pump is provided with suction connections to all hull compartments. A ¾ hp motor driven Goulds Fuel Oil Transfer Pump provides for the efficient transfer of fuel oil between bunker tanks and day tanks.

The *Betty Moran* has two independent steering systems of the St. Louis Ship standard electro-hydraulic follow-up type. One system actuates the two Contraguide steering rudders and the other actuates four flanking rudders. The vessel's hot water heating system consists of an oil fired automatic boiler supplying the convector radiators. Separate electric heaters are furnished for the wash water and potable water. A 15 hp Century Electric motor generator set provides current for arc searchlights.

The entire deckhouse of the *Betty Moran* is insulated with 2 in. of Ultralite where outside surfaces are exposed. All surfaces in the quarters,

Christening party, left to right—Mr. Howard Moore, Mgr. Construction & Repair, Moran Towing & Transportation Co.; Mr. H. T. Pott, President, St. Louis Shipbuilding & Steel Co.; Mrs. Moore; Mrs. Pott; Mr. Joseph H. Moran, II, Vice-president of Moran; Mrs. Richard P. Danis, Sponsor; Mrs. Moran, Matron of Honor; Mr. Richard P. Danis; Mrs. J. Frank Belford, Jr.; Mr. J. Frank Belford, Seaboard Shipping Co.

Two General Motors 60 kw diesel generator sets.



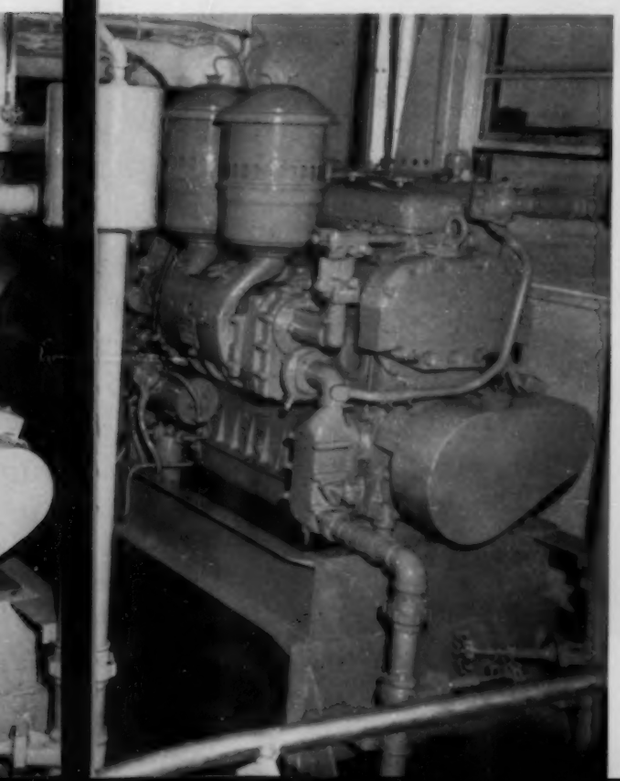
Upper engine room looking forward.

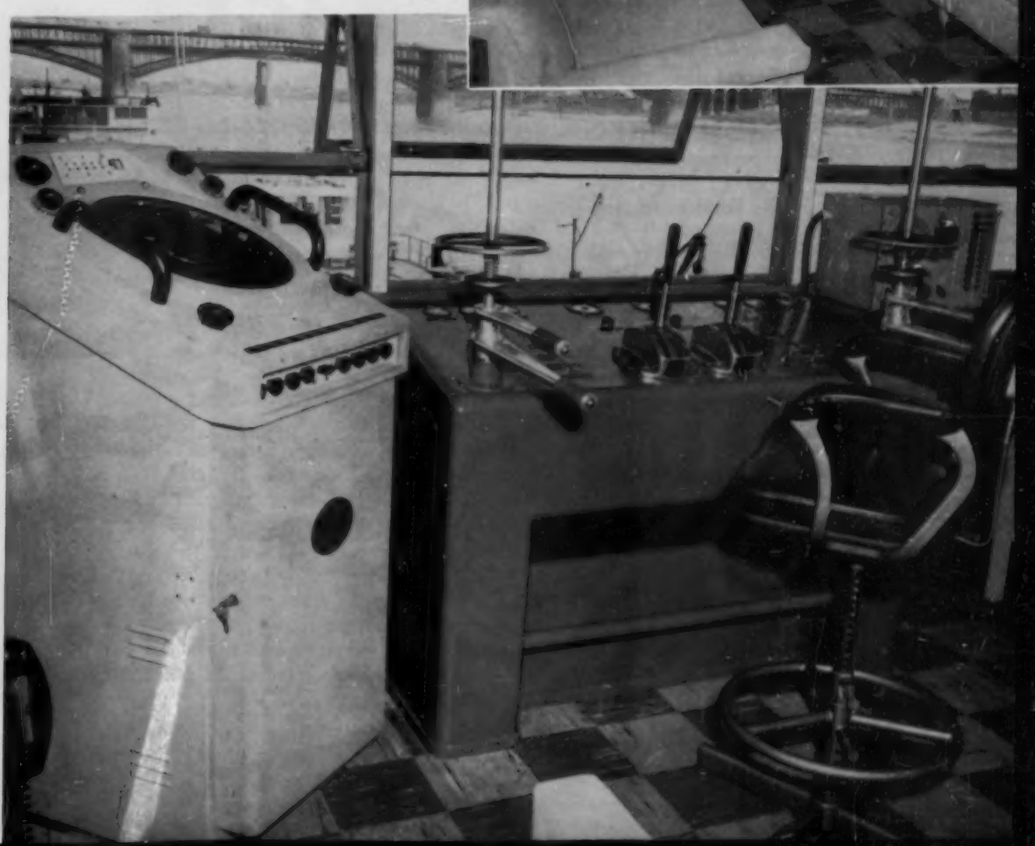
Officers' Lounge and Captain's Office.

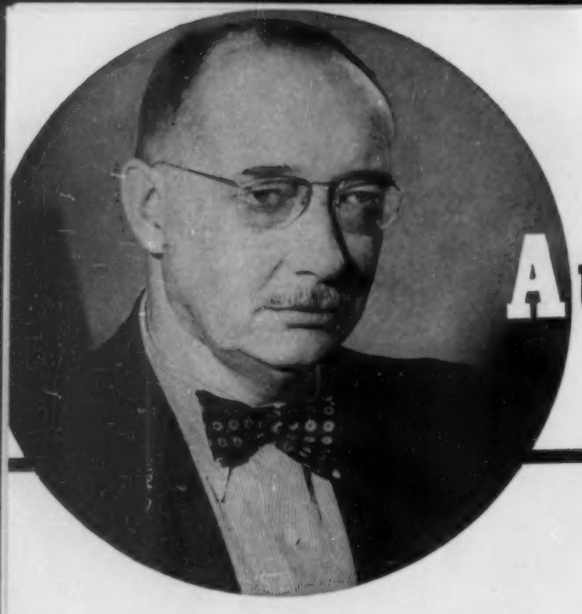
galley and mess and pilothouse are sheathed with tempered masonite, and the deck covering throughout all quarters and public spaces is Armstrong grease proof asphalt tile. The modern galley is fitted with a 54 cu ft Tyler reach-in refrigerator and an 18 cu ft Tyler deep freeze chest. The electric galley range is a Hotpoint. The pilot house of the *Betty Moran* is equipped with the latest advancements in river navigation equipment. From the console there is complete control of the main engines, steering and searchlights. The vessel is equipped with Radio-marine Corporation of America Radio-Telephone and Sperry Radar Equipment.

The two arc searchlights are 19 in. Carlisle & Finch, 45 Amp. and the air horn is a Kahlenberg Bros. 8 in. Triplex. Additional equipment consists of Maxim silencers, Briggs lube oil filters and Ross lube oil coolers; and alterations to Falk R&R gears by Western Gear Corp.

Pilot House showing control console, Sperry Radar and Savage Intercom. Set.







AUTOMOTIVE DIESEL PROGRESS

A COMMENTARY BY **MERRILL C. HORINE**

Merrill C. Horine, for 38 years a member of the Society of Automotive Engineers, has been actively engaged in automotive engineering, sales promotion and training, advertising and editing of automotive publications since 1907. He has contributed numerous papers on diesel and allied subjects to the SAE and other organizations. An officer in the Air Service in World War I, he was a consultant to the Chief of Ordnance and the Automotive Division of the War Production Board in World War II.

SUPPRESSING THE SONES

EXHAUST noise has been under fire for some years – particularly that of commercial vehicles, and several states have determined to do something about regulating it. With equal determination, industry, both producing and using, have taken steps to head off premature efforts at regulation. The first step in any control, whether official or voluntary, is to find a means of measurement. Noise is not a simple thing to measure. We have long had the decibel; but its use in measuring the noise of a motor truck leaves a great deal to be desired. It seems that its scale is logarithmic; that is, in the upper ranges, when sounds become loud, a big difference in sound produces a small difference in decibels. So a new unit of measure has been produced by joint co-operative research in which such organizations as the American Association of Motor Vehicle Administrators, the Automobile Manufacturers' Assn., the American Trucking Assns., the Society of Automotive Engineers joined with several commercial and college laboratories.

The Sone Yardstick

Out of it all has come a new method of sound measurement and a new unit of sound, known as the sone. Within a remarkably short time and with surprisingly little friction, general agreement has been reached on a maximum volume of 125 sones at a distance of 50 ft. Of course the exhaust is not the only source of annoying sound. Tires contribute their share, as do the gears. Diesel engines produce noise in their injection systems quite apart from the exhaust. Springs can be noisy and some air brakes are also guilty. These sounds reach their maximum, of course, on upgrades, when the drive is through the slower gears and shifting is necessary.

One speaker at a recent meeting on the subject naively suggested that exhaust noise suppression sufficient to be drowned out by other noises from the truck should be the goal. This suggests that the solution of the muffler problem could be found simply by making the gears noisier than the exhaust. Sound is qualitative as well as quantitative, and so far no satisfactory instrumentation has been found to analyze sound for its psychological effect, apart from its volume. The new method, however, does take account of frequencies and so approaches the problem of qualitative analysis. Although adoption of the 125-sone limit awaits general adoption by the states, practically all truck manufacturers are planning to qualify as rapidly as possible, a number having already adopted exhaust systems producing less than the allowed maximum in sound level.

Diesels Singled Out

Diesels have been singled out particularly in complaints of exhaust noise, despite that there is nothing about a diesel to make its exhaust inherently more noisy than the gasoline engine. One reason for the bad reputation for noise which the diesel suffers is that because its exhaust is inclined to more smoke and smell, many diesel vehicles employ overhead exhaust. Not only does sound from a stack carry farther than that emitted close to the ground, in most cases; but in most installations the application of an adequate muffler alongside the rear corner of the cab has been difficult to provide.

Until recently, the bulk and weight of a really adequate muffler were prohibitive because it and the stack were universally attached to the cab itself. A flex tube was required between the pipe to the manifold and that to the muffler. Since cabs are almost universally mounted on rubber cushions, maintenance was apt to be high. Lately a trend has started toward return-bend mufflers, mounted under the frame, with the stack supported by a staunch frame bracket, independent of the cab. The necessary guard around the stack is of aluminum and secured to the cab. This has provided adequate muffling and surprisingly enough, some of these return-bend mufflers offer less back-pressure than the conventional in-line type.

Various devices have appeared to supplement the muffler by introducing fresh air into the exhaust stream and by mysterious catalytic devices which are supposed to decrease smoke and smell by an after-burning action. These have yet to prove their merits. One reason for the emphasis on diesels is found in the fact that most of the really high-powered trucks on our highways are diesel. A larger engine may naturally be expected to make more noise than a smaller one, regardless of its operating cycle.

Solution Is At Hand

Fortunately manufacturers of mufflers have been alert to the trend and several of them have been successful in producing models which not only hold the noise level below the 125-sone limit; but in some cases with decreased back-pressure over their predecessors. Of course re-education of a large number of truck drivers will be necessary to dissuade them from the practice of rodding mufflers. Under the mistaken notion that a truck can deliver its full power only with a roaring exhaust, many drivers persist in virtually disemboweling their mufflers by means of a heavy rod forced in through the back opening.

An interesting discovery in this connection is the fact that while mechanically-driven superchargers are known to intensify exhaust noise in addition to the mechanical whine which some of them produce, exhaust-driven turbochargers have the opposite effect. In passing through the turbine, the exhaust gases are broken up, their pulsations smoothed out, they are expanded and cooled. It has been found, indeed, that in some installations the sound level is below 125 sones even without any muffler whatever.

SELLING HORSEPOWER

THE diesel engine of today is a highly perfected piece of machinery. It is designed and built by the manufacturer and purchased by the customer to perform useful work. The measurement of work, horsepower, is the foremost thought in a customer's mind as he makes the engine selection for his requirements. He is buying horsepower; however, the customer is also influenced by the reputation of the product as well as the availability of first class dependable service. An engine, regardless of operating speeds, produces horsepower only when operating under load, therefore, a means of measuring the load is a necessity. Engine manufacturers, recognizing the importance of this measurement, install dynamometers. With these machines engines are tested, run-in and measured for horsepower output before leaving the factory for the field.

Service departments, in today's modern dealerships, are doing everything within their power to maintain the horsepower designed and built into the engines. They also recognize the dynamometer as an important piece of service equipment to scientifically test, run-in, and measure horsepower output of engines overhauled and repaired by them. This procedure has been beneficial to the service shop and the service customer, inasmuch as costly do-over work has been almost eliminated. This do-over work in the past has caused expensive down time for the customer and costly field trips for the servicing dealership.

The benefits realized through dynamometer test are as numerous and diversified as the application of the diesel engine. Service management wonders how it managed to operate before making this installation. Before the installation of a dynamometer, an engine could only be run and checked in a service center by using standard equipment. No means of putting a load on the engine was available. By testing an overhauled engine on the dynamometer, oil and water leaks are easily found and the engine run and tested according to specifications established by the manufacturer. A run-in schedule is followed, whereby the load and speed of the engine is progressively increased until the unit is finally operated at maximum power. Each engine tested is run on the dynamometer for at least three hours. Throughout the test, temperatures and pressure are gradually increased until they reach conditions of normal operation. Friction between moving parts are overcome and final adjustments made while the engine is operating under simulated field load conditions. The completed dynamometer test assures the customer that the engine is developing its designed horsepower. This test and run-in procedure has eliminated the usual customer break-in after delivery. For reference purposes, an engine test report is completed on each engine undergoing a dynamometer test. This report provides a record of engine performance as well as factual proof of the inspections made during the test run.

In operations where exchange engine policy is practical, the ability to stack ready to go units, is considered very important since it saves tied up equipment time for the customer and allows for a more consistent flow of overhaul work in the dealer's shop instead of the seasonal rushes and slack periods heretofore experienced. The fundamental soundness of testing equipment cannot be denied. Service shops are doing all within their power to give the customer horsepower. These shops want to sell the service customer more than parts and labor; they are set up and organized to scientifically test each engine overhaul.

Most of the major engine and truck manufacturers will attest the logic of selling service horsepower, and are actively promoting the use of dynamometers in their distributors/dealers' service operations. Because of the improved methods of overhaul operations such as use of dynamometers as part of the overhaul procedure, today's service customer can expect many additional hours of trouble free engine operation and he can feel assured of obtaining the commodity he needs and pays for, horsepower.

ENGINE DYNAMOMETER TEST REPORT FOR DIESEL ENGINES

Date _____ Engine Make _____ Engine Model _____

Repair Order _____ Engine Serial Number _____

PRE-STARTING

1. Prime Lube Oil System	3. Adjust Valves (Cold)	5. Adjust Fuel Inj. Pump
2. Prime Fuel Oil System	4. Adjust Injectors (Cold)	6. Adjust Governor

BASIC ENGINE RUN-IN

Time at Speed	Time Start	Time Stop	RPM	BHP or Scale Reading	Water Temp.	Lube Oil Press.	Lube Oil Temp.	Blow-by or Crankcase Press.	Air Intake Depress.	Exh. Back Depress.	Blower or Super Charger Press.

BASIC RUN-IN INSPECTION

1. Check and Tighten all Bolts	4. Inspect for Water Leaks
2. Inspect for Lube Oil Leaks	5. Check Valve Mech. Lube
3. Inspect for Fuel Oil Leaks	

BASIC INSPECTION

1. Tighten Cyl. Head (Hot)	3. Adjust Injectors (Hot)	5. Adjust Governor
2. Adjust Valves (Hot)	4. Adjust Injection Pump	6. Adjust Fuel Control Racks

FINAL RUN-IN and TEST

Time Start	Time Stop	Governed RPM No Load	Governed RPM Full Load	BHP or Scale Reading	Water Temp. Full Load	Lube Oil Temp. Full Load	Lube Oil Press. Full Load	Lube Oil Press. Idle

Fuel Oil Press. Full Load	Blow-by or C C Press. Full Load	Air Intake Depress. Full Load	Exh. Back Press Full Load	Blower or S Charger Press. Full Load	Idle Speed	Overspeed Trip

Fuel Consumption Test _____ gallons _____ pounds During _____ Minutes Full Load Operation

TEST CONDITIONS ALTITUDE _____ FT. BAROMETRIC PRESSURE _____ IN. HG. TEMP. _____ °F.

ENGINE MANUFACTURER'S STANDARD TEST CONDITIONS

Altitude not over _____ Ft. Barometric Pressure not below _____ In. Hg. Temperature not over _____ °F.

Derate Horsepower and Decrease Fuel Injection Rate 3% for EACH 1000 FT. ALTITUDE RISE ABOVE STANDARD CONDITION
1% for EACH 10°F. TEMPERATURE RISE ABOVE STANDARD CONDITION

INSPECTION AFTER FINAL TEST

1. Check Generator Charging Rate	2. Check Air Compressor	3. Check Power Take-off
4. Check Emergency Shutdown System	5. Check and Clean Lube Oil Filters	

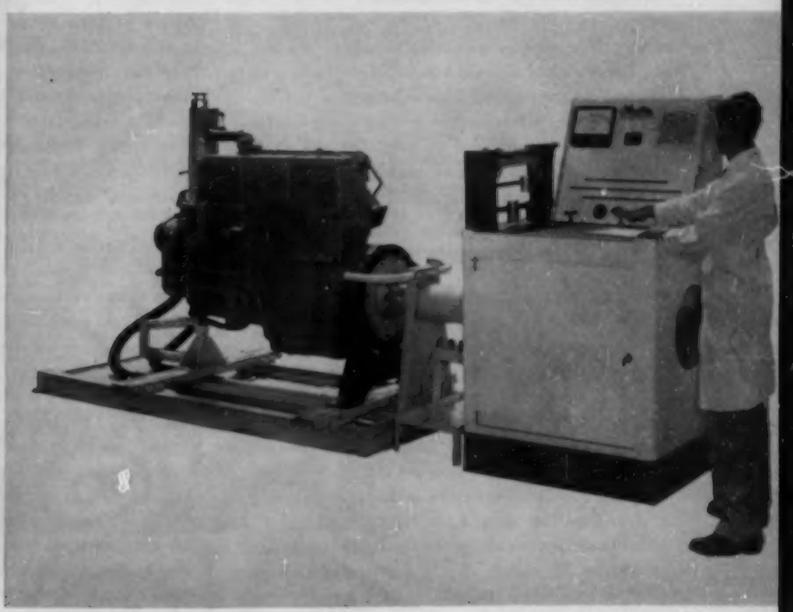
Remarks _____

Signed _____ Dynamometer Operator Date _____

Note. Dynamometer Operator must initial each check and sign this report. Form C-635

A sample engine dynamometer test report form for diesel engines. This test report gives a complete picture of the engine condition, assuring the customer of full value received in his engine overhaul.

A Cummins diesel mounted on a Clayton Universal engine stand and connected to a Clayton 17-500CM dynamometer is ready to be tested and run in.



EASTERN DIESEL OBSERVATIONS

A COMMENTARY BY **ARNOLD B. NEWELL**

Arnold B. Newell, a third generation American, was born near Seattle, Washington of pioneer stock. He obtained his engineer's license at 21. Sailed as chief engineer on one of the first ocean-going motorships built in the U.S.A. In 1924 he joined New York Shipbuilding Company in diesel advisory capacity, tested and took to sea New York-Werkspoor diesels, supervised operation of shipyard owned vessels, then in 1927 joined Ingersoll-Rand as diesel field engineer. Became associated with "Motorship" in 1929. Subsequently became managing editor of "Motorship" and "Diesel Power," then vice-president and general manager.

Transmissions Improve Efficiency

In recent years we have witnessed the development of transmission systems to meet the demand for more work with a prime mover of given power. Strangely the principle employed antedates machinery by many thousands of years. It is one of applying available power or weight at one point to move heavy objects slowly. Levers, prys, the sails on ships and the water wheel in this class of service antedated the gear train, the electric motor and the torque converter as applied to rotating motion and power. In marine service Lester M. Goldsmith was one of the earliest advocates of electric propulsion. He proceeded to demonstrate on tugs his theory that the higher efficiencies obtainable at the propeller of the proper size and rotative speed would improve propulsion efficiency more than enough to compensate for the power losses chargeable to electric transmission. Operation of the diesel at maximum power output regardless of propeller speed was an important factor. That is precisely what the torque converter-gear combinations are now doing at far less cost, bulk and weight than was obtainable electrically and at considerable improvement in mechanical efficiencies over the electric system.

It now develops that we have a situation in which one hand washes the other in an engineering way. General excellence and high efficiency of the diesel in power production has created a big market for effective transmission systems. On the other hand these systems improve performance to such an extent that many more diesel uses are found.

The Magdalena River

While taking notes aboard the Colombian dredge *M.O.P. DH-6 Adenavi* I had an opportunity to discuss the situation on the Magdalena River with various Colombian Government officials. In years past this river was commonly referred to as the Mississippi of South America because of the numerous *Robert E. Lee* type of river craft operating on it. It still is just that because the towboat types used on the North American inland waterways are also used on the Magdalena. What may not be so well known is that the boats are built locally and preference for diesels of American make prevails. We know of course that strong sales pressure from other countries is applied to this market and engine price is a factor of considerable importance. None the less, the techniques used in our inland waters vessels are distinctive to the Western Hemisphere. The Latin Americans prefer our methods. Therefore we find a community of interests strongly influencing the use of machinery built in this country. Sometimes price has less sales appeal than knowhow. Colombia is making a start at straightening out the Magdalena, building levees and eventually will enter upon flood control. Competition by rail and highway transportation is undeveloped. The market for marine propulsion systems should therefore improve as time passes.

The After Market

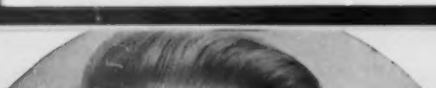
More and more attention is being focused upon the market for parts required in the normal maintenance of diesels. The issue has been somewhat beclouded by references to the part played by independent repair shops and engine rebuilders who take on diesel work. In a recent evaluation of the overall market for internal combustion engines it was found that annual production of gasoline engines, chiefly automobile motors outnumber diesels 100 to 1. While automobile manufacturers endeavor to keep owners in the family by offering good service, the automobile is everybody's business and it provides profitable employment for many people. Knowledge of the gasoline motor is shared by the farm urchin and the garage mechanic alike. Replacement parts are available from many sources including mail order houses. This is not true of diesels.

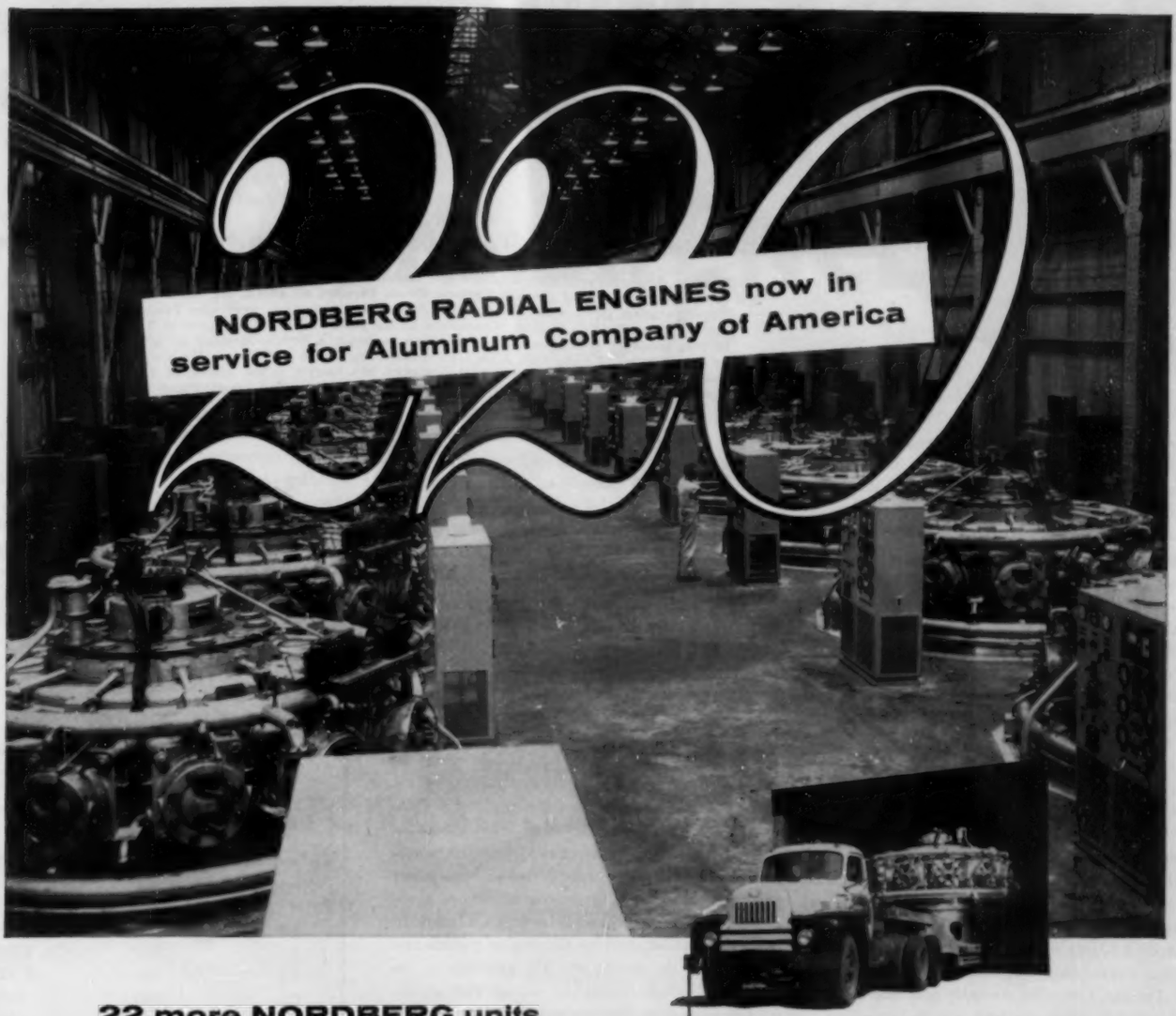
In a recent 5000 mile swing around the country, east of the Mississippi, I asked the operators of fleets of trucks, buses, construction equipment and many diesel manufacturers what methods are used in the routine overhauling of diesels and their accessories. As near as I could learn, better than 75% of this work is under control of diesel manufacturers. The big fleets have their own maintenance shops in which the basic training of the mechanics originate with the engine manufacturer. In some instances the engine companies grant franchises to independents with the understanding that their own methods will be followed in the engine overhauling practices. In this way the segment of the after market represented by the independents is strongly influenced and in many cases fully controlled by the engine maker.

Emergency Generating Sets

A very large market for diesel engines is growing rapidly as the result of demands for emergency generating sets. Recognition of the need for emergency power is by no means new. About two decades ago disasters at sea were far too frequent and lives were lost because illumination stopped when the main power went off. The law made installation of emergency generators mandatory and since the presence of gasoline aboard in substantial quantities was dangerous, diesels were favored by the underwriters and the Government. On land one of the chief incentives to install emergency sets is also to protect lives and property, especially lives. Therefore the extent of application of such sets is influenced largely by considerations of safety. A good example is the use of such sets on thruways and express highways where traffic signals must function regardless of weather, toll gates must be continuously operative and the restaurants and the entire service areas must not be left in darkness. These areas are not only rest, refreshment and fueling stops—they are areas where motorists may go for safety when road conditions are too dangerous for passage.

From the economic viewpoint more and more businesses are learning the value of emergency generating sets just as the telephone companies made this discovery long ago. During a coal shortage brought on by a tugboat strike in New York, Macy's continued with business as usual with power from their diesel plant. During a bad flood in the middle west it was the emergency generating set in a chicken hatchery that supplied power to keep the accounting equipment operating in a local bank at a time when the bank was most needed by the people of the town. In some instances the cheapest kind of generating equipment is purchased in the belief that it is good enough as it will seldom run and never wear out. However, in the majority of cases emergencies of all kinds are looked upon as times when only the best, the most dependable and the very reliable units should be used. This fits the description of diesels now available at reasonable prices. The market will bear further cultivation.





22 more NORDBERG units now on order will provide nearly 475,000 TOTAL HORSEPOWER

• The compact, lightweight Nordberg Radial engines are shipped as complete factory-assembled units. This 12-cylinder, 2125 hp gas burning engine, loaded on a flat bed trailer, is one of 26 units recently installed by ALCOA at their Point Comfort works.

A total of 220 Nordberg spark fired gas burning Radial engines with a capacity of over 400,000 horsepower have amassed a *startling total of over 8 million hours of dependable operation* at the Point Comfort, Texas smelting works of the Aluminum Company of America . . . by far the world's largest internal combustion engine power station.

As part of its continuing expansion of aluminum production facilities, ALCOA recently ordered 22 additional Nordberg units to provide power for a seventh pot line at Point Comfort. This new line will add 20,000 tons to the operation's installed capacity of 120,000 tons annually . . . requiring well over four million kwh per 24 hours.

The 22 newly ordered Nordberg engine-generator units will raise the power capacity to nearly 475,000 total horsepower, and will be the third expansion of electric power generating facilities for the electrolytic reduction of aluminum by Alcoa at Point Comfort.

These impressive repeat orders by ALCOA testify to the fact that the efficiency and low maintenance of the Nordberg Radial engines have contributed significantly to the lowering of aluminum production costs.

NORDBERG MFG. CO.
Milwaukee, Wisconsin

NORDBERG
DIESEL • DUAFUEL® AND SPARK-IGNITION GAS ENGINES

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GAS TURBINE PROGRESS

A COMMENTARY BY R. TOM SAWYER

R. Tom Sawyer's well known in the gas turbine field having been the first chairman (1944) (and now treasurer) of the Gas Turbine Power Division of ASME. He spent 7 years with G.E. Transportation Dept., and 26 years with American Locomotive, now Alco Products. At present he is a Consultant, including "Consultant to the Staff" of the Experimental Towing Tank at Stevens Institute of Technology. In addition to being a Fellow Member of ASME and AIEE, he is a member of SAE, ARS, ANS, IME in London, DEUA in London. He is also a member of Franklin Institute and a Professional Engineer. Mr. Sawyer is the author of *The Modern Gas Turbine* and *Gas Turbine Construction*, and co-author of *Applied Atomic Power*.

IT now looks as if the Rover Company of Great Britain may put into production in 1958 their gas turbine 4 wheel drive high speed motor car. This company the first to build a gas turbine driven auto, has made excellent progress in the small gas turbine field. Few realize that over 500 (200 hp) gas turbines have been purchased from the Boeing Airplane Company for practically every class of service in which a small turbine can be used. In spite of the fact that the turbocharged diesel is more efficient the Boeing engineers are gradually finding many special and interesting applications which are not replacing diesels but actually supplementing them.

While the Solar Aircraft Company has built a large number of their 50 hp turbines it has moved slowly but effectively with its 500 hp turbine. It is of interest to note that this turbine must produce somewhere around 2000 total horsepower to operate the compressor plus the net rating of 500 hp. Let us compare this turbine with a turbocharger used on a highly turbocharged diesel. Rudolph Birmann, Consulting Engineer for De Laval Steam Turbine Company, recently gave me some figures which I think are well worth publishing here. See Table 1 which shows that this turbine also delivers a maximum of about 2000 hp, which power is used to drive the compressor and overcome internal friction (with no net shaft power). The higher its pressure ratio, the more important the function of the turbocharger. The use of higher pressure ratios greatly increases the specific output of the turbocharged engine, improves its specific fuel consumption, and brings about many other advantages. For this reason high-pressure turbocharging has become well established, and the industry is working toward higher and higher pressure ratios. By means of high-pressure turbocharging, the specific output of the atmospheric-aspirated engine has been increased—in the four-cycle engine from a bmep of 85 psi to as much as 300 psi, and in two-cycle engines from 65 or 75 psi to 180 psi, and the end is not yet in sight. Turbocharger pressure ratios of 2.5 to 3 are common today, and substantially higher pressure ratios are likely to be used in the near future. Pressure ratios of this magnitude approach those used in direct-power-yielding gas turbines.

Some 27 years ago when I first took an interest in turbocharging we thought it remarkable to get a 50% increase from the diesel engine shaft. At the annual SAE Diesel meeting recently in Chicago C. G. A. (Art) Rosen of Caterpillar said that a multiple increase in engine power is preferred. In Table 1, (Rudy) Birmann shows one way of getting this multiple increase in engine output from 1000 to 2000 and even up to 4800 hp out of a 4 cycle engine. In other words one continues to increase the pressure ratio of a single stage radial compressor and at the same time maintains a high turbocharger efficiency.

Table 2 shows the need for high turbocharger efficiency. The horsepower outputs shown represent the power the engine develops, during the exhaust and suction strokes of the 4800 hp 4 cycle engine of Table 1, as the direct effect of turbocharging at a 4 to 1 pressure ratio. In other words, this portion of the increased engine horsepower output is heat energy in the engine exhaust gases, converted into mechanical energy, transmitted from the turbocharger to the engine pistons and delivered by the crankshaft. The gain due to the increase in power during the exhaust and suction strokes may only amount to 5% or 6% of the total but note this positive power can be obtained from other than the main power stroke of the engine. This is especially realized when approaching the entire power plant characteristics from the gas turbine point of view. (Rudy) Birmann also repeated an old statement well worth repeating again, that is, neither the efficiency of a diesel nor a gas turbine, each taken separately can equal the efficiency of the two properly combined which is substantially greater. It is also true that with a modern steam power plant, no matter how efficient it may be alone it can be definitely improved when combined with a gas turbine. Brown Boveri call this combination a Velox boiler, many of which have been built. Within this next year we shall hear more about the gas turbine pressurized steam boiler plant for large gas turbines.

Also this year we will hear considerably more about the *G.T.S. John Sergeant* which has just made a splendid trip to Europe and back. This ship is equipped with a 6,600 hp General Electric open cycle gas turbine driving the single shaft with a reversible pitch propeller. The entire new power plant and its arrangement in the rebuilt Liberty ship is actually going through experimental trial runs to determine the future possibilities of rebuilding other Liberty ships with gas turbine power plants. The ship performed like an old trouper during this Atlantic crossing operating at 17 knots instead of the original 10 knots with the former steam plant. The efficiency is not up to that of a diesel ship but does have a fuel rate of approximately .5 lbs/shaft hp per hour. There are of course certain advantages all of which can not be listed here but they include lack of vibration, less space and better cleanliness. Our congratulations to J. J. McMullen and his associates in the Maritime Administration.

Table 1.
Comparative Turbine Horsepower to Diesel Engine.

Turbocharger Pressure Ratio	Turbocharger* Turbine H.P. Output	4 Cycle** Engines H.P. Output
1.0	0	1,000
1.5	170	1,700
2.0	400	2,400
2.5	700	3,000
3.0	1,080	3,600
3.5	1,540	4,250
4.0	2,040	4,800

*Based on pre-turbine temperature of 1,000° F.

**Obviously the 4,800 H.P. engine must be of a more substantial construction than the 1,000 H.P. engine, however, in each case the engine has the same RPM, same displacement and includes intercooling the air into the engine cylinders at 100° F.

Table 2.
4 to 1 Ratio Turbocharger of Table 1.

Combined* Turbocharger Eff. in Percent	Loss or Gain*** Engine Brake Horsepower
40	−550
50	− 80
60	+120
70**	+225
80	+290

*Combined efficiency equals compressor efficiency times turbine efficiency times mechanical efficiency.

**70% can be reached without too much difficulty while 80% is rare and 60% is common, depending upon the design of turbocharger.

***Obtained by retarding or positive action on engine pistons.

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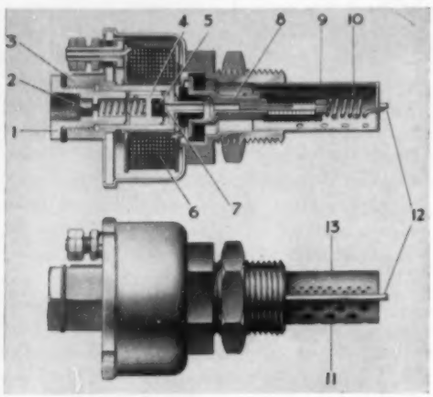
WHAT'S GOING ON IN ENGLAND

CONDUCTED BY **BERNARD W. LANSDOWNE**

Bernard W. Lansdowne is an associate member of the Institution of Mechanical Engineers and is widely known among British and European diesel manufacturers as editor of our English contemporary "Gas & Oil Power." His early workshop training was spread over seven years with A.E.C., Ltd., Southall, following which he served some five years with that company's sales engineering department. He entered technical journalism as assistant editor of "Gas & Oil Power" in 1950 and was appointed editor in 1952.

An Aid to Cold Starting

A simple and inexpensive device for assisting the starting of diesel engines at low temperatures is now being marketed by C.A.V. Ltd. Known as the Thermostart, it is particularly suitable for use with diesel engines which have to stand in the open and it is claimed that starting of even the coldest engine can be reduced to a matter of seconds with obvious advantages so far as engine wear and battery life are concerned. The Thermostart has been tested at temperatures down to 10 deg. F. (-12 deg. C.) or even less in a number of small diesel engines of about 2½ litres capacity. The device makes use of the same fuel as the engine. It is of simple design and is operated merely by pressing a button or turning a switch with no tedious preliminary operations.



It is designed for location in a horizontal position in the inlet manifold, preferably as near as possible to the point where the manifold divides and in the case of an engine with a pneumatic governor, on the engine side of the venturi butterfly. Fitting is a simple operation and only requires a drilled and tapped hole into which the Thermostart is screwed. Fuel supply to the Thermostart is by gravity and the fuel container is automatically topped up with clean fuel when the engine is running by a feed from the final fuel oil filter. The sectioned illustration shows the construction of the unit which consists basically of a core (3) a solenoid (6) a spring-loaded plunger (4) fitted with a special rubber insert (5) which butts against a valve seat (7) a coil carrier (8) bearing two heater coils (9 and 10) and a circular shield having large perforations on one side (11) small perforations on the other (13) and a small flange (12) running along its outer surface.

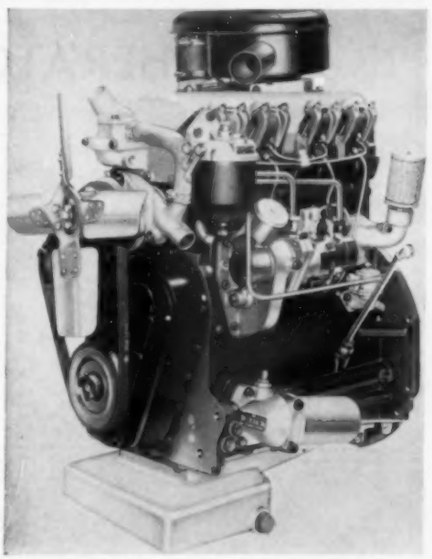
Fuel oil from the container fills the pipe, adaptor (1) filter (2) hollow plunger (4) and the groove in the surface of the plunger. When the operating switch is pressed, solenoid (6) and coils (9 and 10) are energized. Magnetism induced in the plunger (4) and adaptor (1) by the solenoid (6), draws the plunger and the rubber inset off the valve seat (7). Fuel then flows at a controlled rate along and around the coil (9) which vaporizes it. Coil (10) reaches the ignition temperature of the fuel vapor. As soon as the engine is cranked, fresh air is drawn into the inlet manifold and enters the circular shield through the small perforations (13) mixing with the vaporized fuel inside it. Coil (10) ignites the resulting mixture and so heats the air for combustion as it is drawn into the cylinders, and thus permits easy ignition of the injected fuel. The flange (12) running along the outer surface of the shield provides a sheltered zone around the outlet holes (11) and protects the flame from the incoming air stream.

New Commer Light Diesel

Commer Cars, Ltd., of Luton, who are members of the vast Rootes Group of companies, have introduced an entirely new diesel engine for fitment to their ¾- to 2-ton range of commercial vehicles. The new engine has created considerable interest in England, because it incorporates for the first time on a production unit here, a distributor-type fuel injection pump. This is the C.A.V. type DPA pump which has been developed from the American Hartford design to suit the special requirements of British operating conditions. The new Commer engine also has built-in, as standard, a new form of C.A.V. cold-starting device, which is the subject of a separate note in this column.

Dealing with the engine in detail, it is a four-stroke unit with four cylinders of $3\frac{5}{16}$ in. bore by 4 in. stroke. This gives a displacement of 2,260 c.c. to provide an output of 54 bhp at 3,000 rpm. The maximum torque is 97.5 lbs ft at 2,100 rpm. The engine is based on a cylinder block and crankcase formed as a single casting in high duty alloy iron, designed to give maximum strength and rigidity with full length water jackets to the renewable, dry, slide-fit liners. Ricardo Comet Mark III combustion chambers are incorporated in the cylinder head, which carries the overhead valves in renewable guides.

The valves are of special alloy steel, the inlet being larger to secure maximum volumetric efficiency, and valve operation is by the conventional rocker gear and push rods. The fuel injectors are located accessibly on top of the cylinder head. The C.A.V. distributor type fuel pump is mounted on the left-hand side of the engine and driven by a gear on the camshaft through an intermediate gear. Fuel is fed from a mechanically-operated fuel pump through a filter and the pump embodies a variable speed hydraulic governor.



New 54 hp four cylinder Commer diesel showing CAV distributor injection pump clearly.

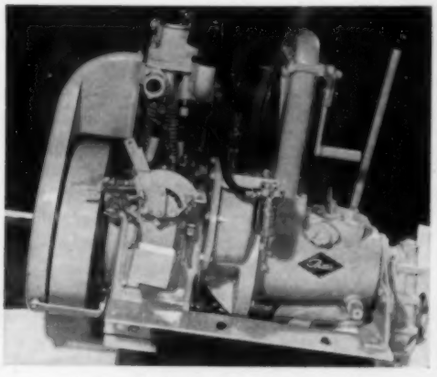
The pistons are of annodized aluminum alloy with depressions in the crown to promote swirl. They have solid skirts and carry three compression rings and one scraper ring with provision for a second oil control ring, if required. The H-section connecting rods are secured to the pistons by fully-floating large diameter gudgeon pins, the rods being of low weight to reduce inertia stresses. The connecting rod bearing cap attachment bolts are inclined at an angle to the centre line enabling the rods to be withdrawn through cylinder bores.

Big end bearings are of precision-finished lead indium steel-backed type. Three similar bearings carry the crankshaft which is statically and dynamically balanced and machined from a solid nickel chromium molybdenum steel forging. The camshaft drive is through a duplex roller chain provided with a hydraulic tensioner.

High-pressure lubrication for the engine is provided by an eccentric lobe-type pump, gear driven at the front end of the crankshaft.

Petter Marine Line

A range of small air and water cooled marine diesel engines has been added to the list of Petter units now in production at the company's Staines factory in Middlesex. The range is based on established Petter designs, many thouasnds of which have been applied in the past to land-based applications. Single- and twin-cylinder engines are available giving an output of 6 bhp per cylinder and transmission systems can be supplied to provide (1) reverse and reduction (2) reverse or (3) clutch and reduction. By offering air and water cooling, Petters enable any operating condition to be safely met. In many marine applications, of course, the air cooled engines have important advantages over the water cooled design. Troubles arising from freezing or dirty water supplies are eliminated and there is an overall saving in weight of about 10 per cent. Readiness for service in all weathers is particularly important for ships' lifeboats, and the outstanding advantage of the air cooled engine for this application is the facility of starting and running the engine while the boat is still in the davits.



Single cylinder air cooled Petter Marine diesel fitted with reverse and 2:1 reduction gear, rated at 6 hp.

Much of the running gear in the new marine units is common to the earlier Petter AV design, the units having bore and stroke figures of 80 mm. by 110 mm. giving a cubic capacity of 533 c.c. per cylinder. The output of 6 bhp per cylinder is at a speed of 1,800 rpm. A comprehensive series of auxiliary equipment is available for all engines including such items as plumber block, standard stern gear, oil pressure gauges, fuel tanks for separate mounting, etc.

New Merlin Service Aids

A system of high-pressure phasing for fuel injection pumps is now available from Merlin Engineering Co., Ltd., of Halifax, as standard equipment on their test benches. The system offers a new method of carrying out both the timing and phasing operations on fuel injection pumps. In the past, it has been necessary to remove the delivery valves from the pump for accurate timing purposes, but with the high-pressure system this is obviated with a consequent saving in time of some 30 minutes per six-cylinder pump.

With the high-pressure system, the pump is mounted on the test bench and a hydraulic pressure of 250 lb per sq in. is created in the pump gallery. This is sufficient to overcome the delivery valve spring and lift the valve from the seating. When the element plunger is at the bottom of its stroke, the ports in the element holder are uncovered and the fuel oil has a free passage past the delivery valve to open atmosphere by way of a swan-neck pipe. As the pump camshaft is rotated, the element plunger covers the ports and it is in the final stage of covering the ports that the flow of oil which is visible from the swan-neck pipe, ceases. This is known, of course, as the spill cut off position and it is in this position that the pump is *timed* on No. 1 cylinder, in firing order. A vernier on the half coupling of the pump casing is used to record permanently this position, which must be referred to when the pump is installed on the engine. The phasing of the other elements of the pump is carried in the same manner as the timing and a degree plate incorporated in the test bench is used for the necessary tappet adjustment.

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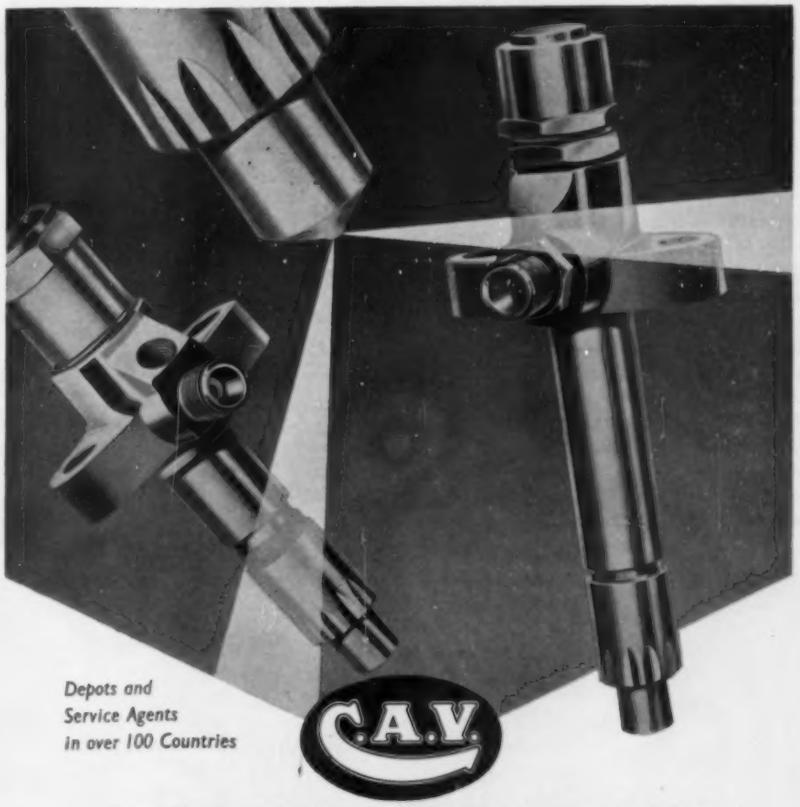

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AP.174-819

Gulf Coast Diesel Notes

By Michael T. Pate

TURBOLITE Company, Houston, has secured from Stewart & Stevenson Services, Inc., Houston, a 2-cylinder series 71, model 2031-C General Motors diesel on the fully enclosed type which will be used to drive a centrifugal fan for cooling sulfur.

TELLEPSEN Construction Company, Houston, has bought from Stewart & Stevenson Services, Inc., of Houston, four General Motors diesels. Two series 110, 6-cylinder model 62206 marine diesels, equipped with General Motors 4½:1 hydraulic reverse and reduction gears will be used as a matched pair in a 45 ft steel towboat. The other two will be a matched pair of series 71 diesels, models 6071-A and 6072-A, equipped with General Motors hydraulic reverse and reduction gears 1½:1 ratio, to drive a 38 ft twin-screw crew boat.

GULF Refining Company, Pipe Line Department, has taken delivery through Peddlers, Inc., of Houston, of a model 6DT468 Allis Chalmers 60 hp diesel, to be connected to a Worthington pump for pipeline gathering service. The diesel was secured from Allied Power Equipment & Manufacturing Company, Houston.

HUMBLE Oil & Refining Company, Houston, has bought from Stewart & Stevenson Services, Inc., Houston, a series 51, model 43200, 4-cylinder General Motors marine diesel with General Motors 2:1 hydraulic reversing and reduction gear which will be used with a similar motor already installed in a crew boat, the second unit permitting conversion of the craft to twin-screw drive. Rated hp is 80.

GARDNER-DENVER Company, Dallas, will use four model 6NKDBU Waukesha diesels, rated each at 263 hp at 1100 rpm on drilling rig service in Canada. The diesels were bought from Waukesha Sales & Service, Inc., Houston.

HALLORAN Equipment Company, Houston, will power a pump with a series 71, model 4031-C, 4-cylinder General Motors diesel, rated at 80 hp. The engine was furnished by Stewart & Stevenson Services, Inc., Houston.

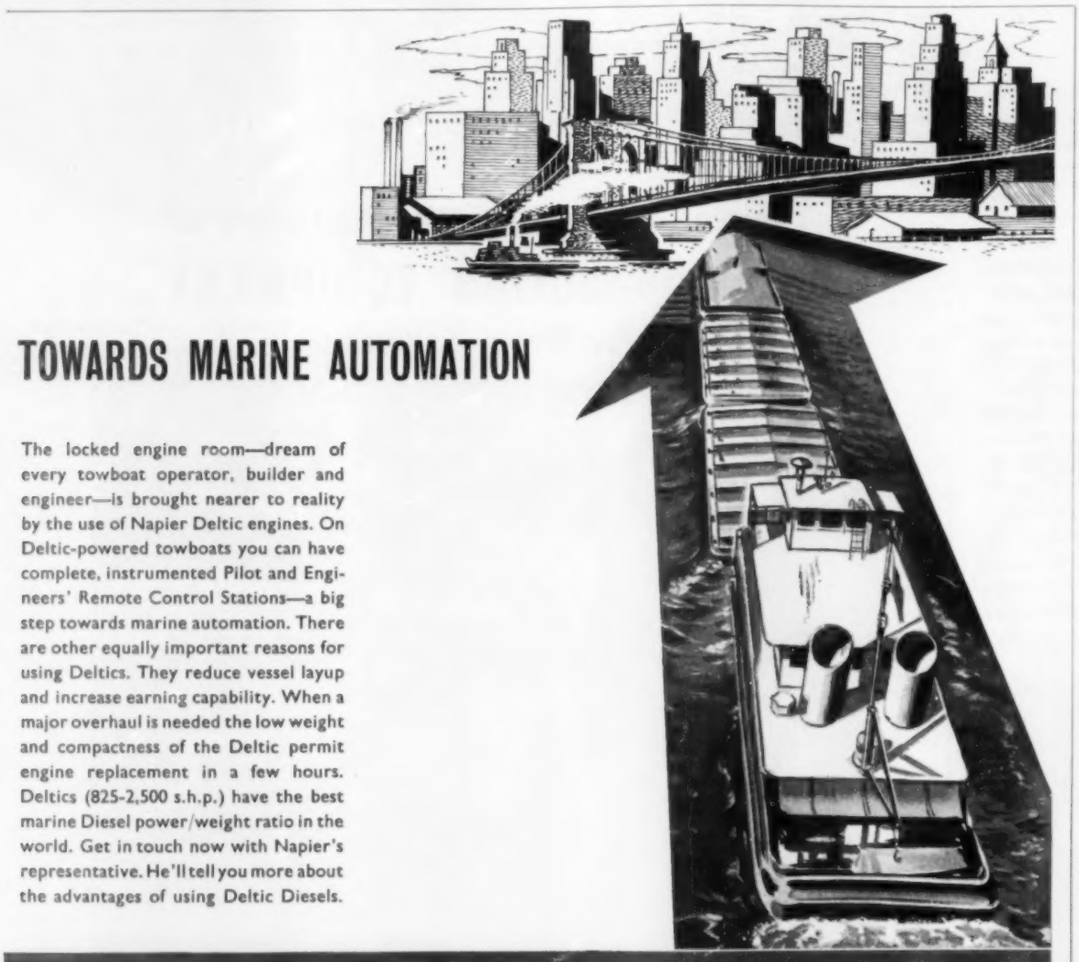
HOUSTON Armature Works, Houston, has taken delivery of a model 8DCS2505 Allis Chalmers diesel from Allied Power Equipment & Manufacturing Company, Houston. The engine will be installed with a 250 kw generator to furnish power for the Baroid Division, National Lead Company's barites mining and milling operation in South America.

DIAMOND Alkali Company, Deer Park, Texas, has taken delivery of two 250-amp Lincoln electric welding generators from Big 3 Welding Equipment Company, Houston. The units are powered by Hercules DIX4D 4-cylinder diesels, rated 40.5 hp continuous.

CARIBBEAN & Macomber Brunzell, Coral Gables, Florida, have taken delivery from Stewart & Stevenson Services, Inc., Houston, of a Stewart & Stevenson model 2GD35C ac generator driven at 1800 rpm by a series 71, model 2030-C 2-cylinder General Motors diesel.

SALT WATER Control, Inc., Houston, has bought from Waukesha Sales & Service, Inc., Houston, a model 180DLCU Waukesha diesel, rated 33 hp at 2000 rpm. The purchaser will use the diesel in a desander machine at New Iberia, Louisiana.

GEORGE E. Failing Company, Houston, will drive a 7¼x12 Gardner-Denver mud pump with a series 110, model



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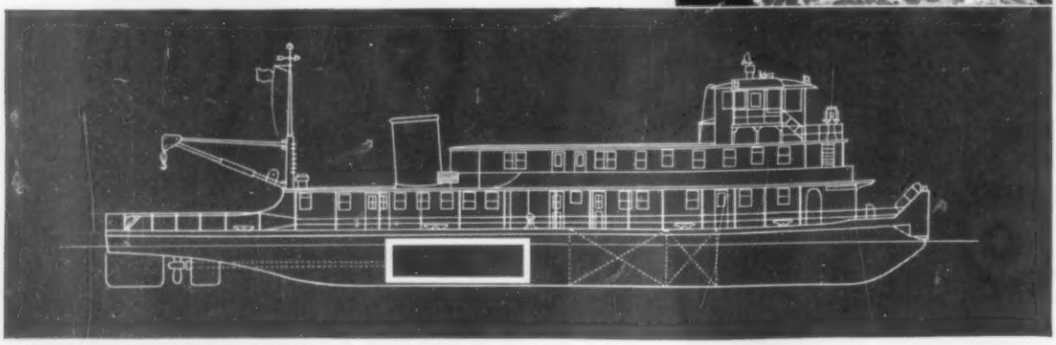
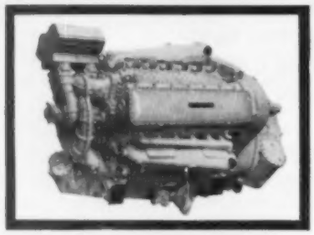
The locked engine room—dream of every towboat operator, builder and engineer—is brought nearer to reality by the use of Napier Deltic engines. On Deltic-powered towboats you can have complete, instrumented Pilot and Engineers' Remote Control Stations—a big step towards marine automation. There are other equally important reasons for using Deltics. They reduce vessel layup and increase earning capability. When a major overhaul is needed the low weight and compactness of the Deltic permit engine replacement in a few hours. Deltics (825-2,500 s.h.p.) have the best marine Diesel power/weight ratio in the world. Get in touch now with Napier's representative. He'll tell you more about the advantages of using Deltic Diesels.





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62403 General Motors diesel, rated at 200 hp. The engine was furnished by Stewart & Stevenson Services, Inc., Houston.

FLANNIGAN Trailer Sales, Inc., Houston, has secured from Mustang Tractor & Equipment Company of Houston, two Caterpillar model D315 35 kw single phase, 60 cycle self-regulating constant voltage diesel electric sets to be used to supply power for trailer camp site.

PAUL WRIGHT Electric Company, San Antonio, Texas, has taken delivery of a model 8DAS1125 Allis-Chalmers diesel electric generator from Allied Power Equipment & Manufacturing Company, Houston. The 150 kw unit will be installed in the Federal Reserve Bank there as reserve electric power and will be equipped to take over automatically on failure of the purchased power source.

SUPERIOR Oil Company, Houston, has taken delivery through National Supply Company of a pair of Stewart & Stevenson model 110GD100 ac generating sets, each driven by a series 110, model 62406 6-cylinder General Motors diesel. The sets are rated at 100 kw each, and are destined for the company's operations in the Lake Maracaibo region of Venezuela, S. A.

SCHLUMBERGER Well Surveying Corporation, Houston, will use eight model 6DA273 Allis-Chalmers diesels on their specially designed well-logging units. The 50 hp engines were delivered by Allied Power Equipment & Manufacturing Company, Houston.

CIRCLE Drilling Company, Eunice, Louisiana, has secured from Waukesha Sales & Service, Inc., Houston, two model 135DKBS Waukesha diesels, each equipped with Capitol reversing and reduction gears. The diesels will be paired in a service boat.

NICKLOS Drilling Company, Houston, will power three Dupont 34 ft steel crew boats with as many series 71, model 6071-A 6-cylinder, 160 hp General Motors marine diesels, each equipped with a General Motors 1½:1 hydraulic reduction and reversing gear.

AUTOMATIC Power, Inc., Houston, has taken delivery from Applied Power Equipment & Manufacturing Company, Houston, of 24 model 2BD77 and two model 2BD153 Allis-Chalmers diesels, which will be used by the company to power navigational aids for the offshore oil industry.

STANDARD Vacuum Oil Company (Export Division) New York City, has taken delivery from Stewart & Stevenson Services, Inc., Houston, of a series 71, model 4029-C, 4-cylinder 80 hp General Motors diesel on a special long base with extended shaft and pillow block which will be used to drive a 4x6 Oilwell pump.

HOUSTON Oil Field Material Company, Houston, will use a 260 hp twin-six General Motors diesel, series 71, model 12103 for mud pump drive. The diesel unit was secured from Stewart & Stevenson Services, Inc., Houston.

Heat Exchanger Catalog

A 16-page illustrated Catalog No. 1156 is offered by the Young Radiator Company, Racine, Wisconsin, on its new line of Removable Tube Bundle Heat Exchangers Type R and RW. The catalog contains all necessary design, capacity and dimension data required for complete selection and specification of Exchangers for hydraulic equipment, diesel engines, gas engines, compressors, transformers, machine tools, cutting fluids and similar applications, and for chemical, pharmaceutical and food processing. Write for free copy. (ITS NEW)

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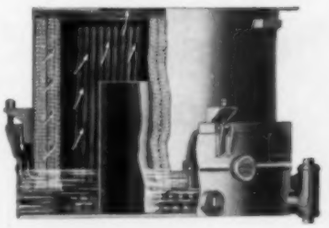
"One Air-Maze oil bath air filter has saved $4385.79 in 27 months!"



HERE are the dollar-and-cent results of a leading midwestern railroad's 27-month test of an Air-Maze oil bath air filter. These results show the sound, economical reasons why dozens of top-flight railroads are switching to Air-Maze oil bath filters for air intakes on hundreds of diesels in freight, passenger and switching service. These are the facts from the actual report:

"Savings with Air-Maze oil bath filter for 27-month period from December, 1953 to April, 1956, are:

Reduced cost of power assembly change-outs	*$2880.00*
Reduced cost of servicing	*1505.79*
Total savings for 27-month period	*4385.79*
Annual savings	*1949.24*
Rate of return on investment for oil bath filter	*354%*

Formerly the engine was equipped with panel filters that had to be cleaned and changed once a day. The oil bath filter needs servicing only once every three months. Equally outstanding are the facts about the Air-Maze oil bath filter's efficiency. The oil bath filter is effective at *all* engine speeds—does not depend on high air velocity to do a top filtering job. It works effectively at low pressure loss . . . is not affected by humidity or oil mist conditions.

According to recent, extensive testing by an independent laboratory (which was selected not by Air-Maze, but by one of our customers), the Air-Maze oil bath filter removes 59% more fine Arizona road dust than the next best filtering device in use today.

If you want to cut both *filter* and *engine* maintenance costs as well as extend power assembly life, it's time to equip your diesel locomotive with Air-Maze oil bath filters. For further information, see your locomotive builder or write the Air-Maze Corporation, Cleveland 28, Ohio.

* Additional data furnished on request.

The biggest names in diesels are protected by Air-Maze filters

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The Filter Engineers

Florida Diesel News

By **Ed Dennis**

THE J. Frank Knorr Co., Miami, repowered the 52 ft motor sailer *White Cap*, owned by Dr. George Menninger, from a 90 hp gasoline engine to a model 6DAMR273 Buda diesel rated 85 hp driving a 24 x 14 Columbian propeller through 2.56:1 r&r gears, for an increase of 2 knots over the gasoline engine.

AT KEY WEST, the *Scotch & Soda*, a shrimp trawler owned by F. G. Toomer, received an HRMS, 225 hp Cummins diesel. While up at Fernandina Beach Sherman Evans had a pair of HRM 165 hp Cummins diesels installed in his shrimper *Hornet*. Both installations were engineered by Cummins Diesel Engines of Florida.

RECENT Cummins dieselized hiway tractors added to Florida's fleet were a JT turbocharged for L. G. Thompson, a HRFB 600 rated 180 hp for R. R. Cotter and a JBS 600 150 hp for G. W. Stafford; all were in Diamond T over-the road tractors.

AUTO Marine Engineers, distributors of Hercules and Enterprise diesel engines for South Florida, have enlarged their parts department and warehouse facilities with an annex of over 6,000 sq ft at 3582 N. W. 32nd Street, Miami.

SHELLEY Tractor & Equipment Co. has announced the appointment of Tom Sutter as Asst. Sales Engineer on industrial diesel engine engineering and installation. Mr. Sutter, a graduate engineer of the University of Miami, spent four years in the Marine Corps and formally worked for the Giffin Industries of Coral Gables.

FOR THE Corps of Engineers, at Jacksonville, 3 model 38D8 1/8 each rated 800 hp, Fairbanks-Morse diesel engines.

ANOTHER twin screw sports fisherman that was launched at Chris Boat Yard on the Miami River, was the *Striper*, a 38x 12.6 footer, powered with two General Motors 4-51 diesels and Paragon clutches.

DIESEL Engine Sales Inc. of St. Augustine, builders of dieselized Florida type shrimp trawlers, has acquired the St. John's Boat Yards, in the same city. This Florida firm has launched almost 600 vessels in a matter of only a few years.

VENEZUELA bound, for the Orinoco Mining Co., the 57 ft tug *Indio* was built by the Diesel Shipbuilding Co. of Jacksonville. Powered with a 500 hp D397 Caterpillar diesel driving a 60x40 five bladed Federal propeller through 3:1 reduction gears and sponsored by Miss Lucy Driscoll, daughter of the superintendent of floating equipment for the Orinoco Mining Co.

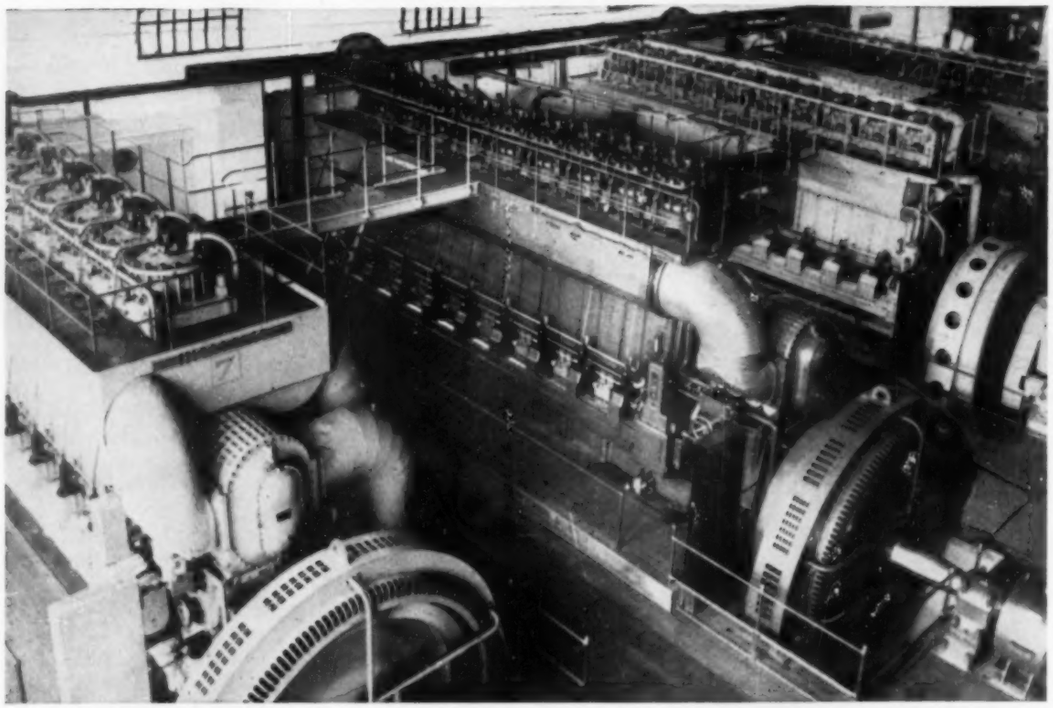
TWO Fairbanks-Morse, model 38F5¼, 4 cyl. diesel engines, rated 330 hp each, were sold to the REA Construction Co. of Charlotte, North Carolina.

TO THE *Lady Belle* of St. Mary's, Ga., goes the honor of being the first shrimp trawler that had a turbocharged Caterpillar marine diesel, model D337, series F, installed. Rated 182 hp at 1600 rpm, it drives a 50x44 Columbian bronze propeller through 4.4:1 r&r gears. The auxiliary generator is a 3 kw Onan diesel.

ELLIS Diesel Sales & Service of Ft. Lauderdale, repowered a model 200 Osgood dragline with a General Motors 2055 diesel (2-71) with GM power take-off and clutch for H. C. Drew of Fort Lauderdale, Florida.

THE SOUTHERN Silica Sand Co., Inc. of Opa Locka, Fla., had constructed a portable dredge, which can be transported by truck. Powered with a General Motors 6-71 diesel and a Higgins marine transmission to provide power

Look to COOK for Better Rings!



After 25,037 operating hours... Cook rings good for 10,000 more!

HERE'S the result of a cylinder inspection by Rockville Centre, N. Y., municipal power plant officials. It's a report on their No. 8 Diesel unit after almost three years of continuous operation.

"While several rings were replaced in Grooves 1 and 2, Cook rings in Grooves 3, 4, 5 and 6 could run for another 10,000 hours! And cylinders averaged less than .001" maximum wear per 1000 hours of operation."

Light-tight Cook Piston Rings prevent scuffing and blow-by . . . conform perfectly to the cylinder wall because they are re-turned as a final manufacturing process. In addition, Cook rings are tensioned by an exclusive, gentle "squeezing" process that guarantees constant, uniform tension — *for life!*

For complete information on Cook Piston Rings and name of nearest representative, write: C. Lee Cook Company, 912 South 8th Street, Louisville 3, Kentucky.

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SHELLEY Tractor & Equipment Co. installed a model D397 Caterpillar diesel generating set on the second floor of the Miami Beach Federal Savings & Loan Assn. It weighed 18000 lbs with the Columbia 375 kva 208-120 volt, 1040 amp generator. The installation included Young heat exchangers and Korfund vibration dampers and the exhaust pipe runs 11 stories high.

THE *Malabar XIII*, a 54x11 ketch, which won the trans Atlantic race from Havana to Spain in 1951, was recently repowered from an 85 hp gasoline engine to a model 6DAMR273 Buda 85 hp diesel engine, to drive a 23x15½ Equipoise propeller through 2.56:1 r&r gears and give it a speed of 9 knots or an increase of 2½ knots. Installation was made by J. Frank Knorr Inc. of Miami, Florida.

TWO ONAN diesel 3 kw 110 volt diesel generating sets were installed on the 50 ft yacht *Inshallah II*, owned by Brig. Gen. A. E. Alexander, Ret. U. S. Army, by Ellis Diesel Sales & Service of Fort Lauderdale.

POWERED with model HD260 Continental 61 hp diesel engines (3⅞x5½) and Allison torque converters, 3 Galion rollers were delivered to R. H. Wright & Son, road contractors of Ft. Lauderdale, by Florida Georgia Tractor of Miami.

GENERAL Motors dieselized Euclid construction equipment that moved into Florida is, a 6-71 in a bottom dump for Three Bays Development Co., Fort Lauderdale, a 6090 in a bottom dump for Meekins Construction Co., Deerfield Park, and B. B. Doan of Ft. Lauderdale received his second off-hiway bottom dump with a GM 4090 diesel.

G. S. DOUGLAS received a multi-purpose Gradall, for earth moving, mounted on a 150 hp Cummins dieselized truck and powered with a 4 cyl. International 50 hp diesel which drives a La Plant Choate hydraulic pump through a Twin Disc clutch; a power house on 10 wheels.

THE JACKSONVILLE Branch of the Detroit Diesel Div. GMC supplied the 6-71 diesels for the twin screw, 49 ft yacht, *Target*, built by Huckins Yacht Corp. for Mr. F. Eberstadt of New York, with GM hydraulic 1.5:1 r&r gears and 24x24 Equipoise propellers for a speed of thirty knots.

Boat Show Exhibit

The Snow-Nabstedt Gear Corporation, manufacturer of S-N and Joes gears, will feature in its exhibit the new S-N 3900 series of reverse-reduction gear in Booths C-108-9 at The National Motor Boat Show. The manufacturer will show two hydraulically actuated models, one in operation and one open for inspection. These marine transmissions will have a capacity of 500 hp at 1600 rpm. Standard reduction gear ratios up to 5:1 are offered with these units. It will be noted that the helical ground gearing is rigidly supported by large roller bearings.

These sturdy and compact gears are specifically designed for heavy commercial boat installations. They are ideally suitable for the new, powerful, high-speed diesel engines, and will give equal life in either forward or reverse at input speeds up to 2000 rpm.

NOW AVAILABLE! The Completely new Volume 21 of **DIESEL ENGINE CATALOG.** This giant, fully illustrated reference book containing complete and detailed engine and accessory sections is bigger, better than ever before. Mail orders are now being filled for this "Bible of the Industry," which has been revised, rewritten and brought up to date completely from cover to cover. Orders are being accepted for this limited edition, which costs $10 postpaid plus California sales tax where applicable. Send checks or company order forms to **DIESEL PROGRESS,** 816 N. La Cienega Blvd., Los Angeles 46, California.

For Faster Ship Docking

The Virginian Railway Company picks GM Diesel-Electric Drive

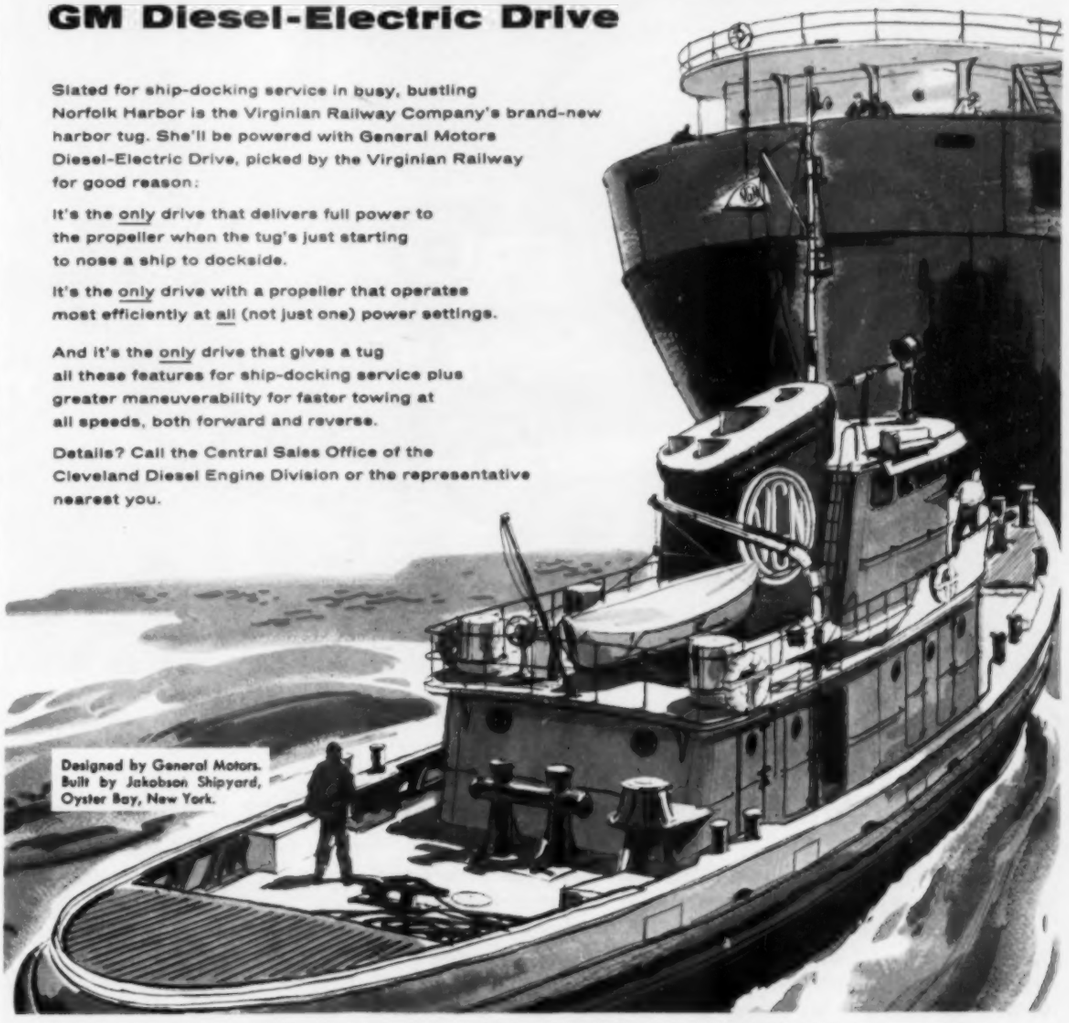
Slated for ship-docking service in busy, bustling Norfolk Harbor is the Virginian Railway Company's brand-new harbor tug. She'll be powered with General Motors Diesel-Electric Drive, picked by the Virginian Railway for good reason:

It's the only drive that delivers full power to the propeller when the tug's just starting to nose a ship to dockside.

It's the only drive with a propeller that operates most efficiently at all (not just one) power settings.

And it's the only drive that gives a tug all these features for ship-docking service plus greater maneuverability for faster towing at all speeds, both forward and reverse.

Details? Call the Central Sales Office of the Cleveland Diesel Engine Division or the representative nearest you.



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San Francisco, Calif., 870 Harrison St. Tel.: Douglas 2-1931

Seattle, Wash., 1230 Westlake Ave. N. Tel.: Adler 1440

Wilmington, Calif., 433 Marine Avenue. Tel.: Terminal 4-4098

GM CLEVELAND DIESEL

Northeast Diesel Notes

By Arnold B. Newell

TWO matters of interest to the diesel industry are the study being made to determine a feasible route for a canal connecting Pittsburgh with Lake Erie and the other is growth of the shipbuilding industry on the Great Lakes as the result of the Seaway. The route from Pittsburgh to Lake Erie would of course increase the diesel towboat fleet on the Inland Waterways. If Great Lakes shipyards compete with coastal yards because the Seaway opens a deep water route to salt water, the diesel industry may or may not benefit materially for at present, at least, this would appear to be a new competitive development between interests on fresh and salt water to capture future business when the time is ripe to do so.

THE GREAT Neck High School of Great Neck, New York has purchased three standby generating sets for installation in the school. Sold by Griffin Equipment Corp. of New York City, these are a 35 kw, a 45 kw and a 55 kw units. Two are driven by a General Motors Model 3061A and the other by a Model 4061A GM diesel.

IT IS expected that diesel driven fishing vessels will be built in larger numbers now that a 10 million fund for loans has been made available thru the Fish & Wild Life Service at Washington, D.C. It is understood that the Department of Interior has expedited the availability of money in the Fisheries Loan Fund from which construction loans will be granted.

THE scallop dragger *Stanley M. Fisher* has been launched at the Harvey Gamage Shipyard, South Bristol, Maine. The vessel which is powered by a 435 hp Cummins diesel is 83 ft long with a 19 ft 7 in. beam and will be owned by George Fisher of Oak Bluffs, Mass. Dwight S. Simpson & Associates of Boston are the designers.

A GENERAL Motors diesel Model 3031 C and a Peerless centrifugal pump have been purchased by George M. Brewster of Bogota, N. J. for irrigation of his estate at Pikes Pond, Pa. Griffin Equipment Corp. of New York made the sale.

THE FIBERGLASS Division of Pittsburgh Plate Glass Corp. at Hicksville, Long Island just bought a 40 kw General Motors diesel generating set, also from Griffin Equipment Corp. of New York.

A 45 hp Allis-Chalmers diesel provides essential propulsion power for the new 40 ft ketch Golden Eagle built by the Southwest Boat Corp. of McKinley, Maine for Edward H. Earle of Wellesley, Mass. The builder of this smart vessel is the Davis Boat Yard and the design is from the boards of S. S. Crocker.

BLOUNT Marine Corp. of Warren, R. I. has been awarded a contract to build a 200-passenger steel ferry for sightseeing service at Soo Locks, Mich. The contract was placed by M. W. Welch of Saulte Ste. Marie, operator of an excursion service thru the locks. Particulars of the diesel machinery and dimensions of the new vessel have not yet been made public.

THE ATLANTIC Refining Company of Philadelphia has taken delivery of a 96 ft tug built by Avondale Marine Ways of Avondale, La. The power is a General Motors diesel-electric plant of 1000 hp.

A 44 ft sport fisherman was completed recently by the Baum Boatbuilding Company, Kenneybunkport, Maine. The owner is Clarence Oakman of Rutland,

NEPTUNE

...Powered by Fairbanks-Morse Opposed-Piston Marine Diesel Engine

The Neptune has everything needed for the great towing jobs of the future including the most modern of marine power—the F-M Opposed-Piston Diesel.

Only opposed-piston marine diesels offer all these design advantages:

Two-cycle design . . . that eliminates more than 40% of the wearing parts found in engines of comparable horsepower.

Uniflow scavenging . . . that provides greater horsepower, increased thermal efficiency for utmost in fuel oil economy.

Opposed pistons . . . of equal weight reacting to combustion in a single-cylinder liner producing smooth, responsive power with practically no vibration.

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National Motor Boat Show
Booth B-1
New York Coliseum
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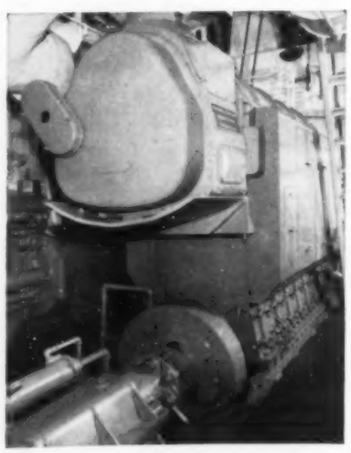

New 8-cylinder Model 38D 8¼ direct reversible marine engine of the type that provides power for the tug *Neptune*.

Vt. To the design of Herbert Baum, the smart vessel has a beam of 12½ ft and a draft of 3½ ft and the power is a 155 hp Hercules diesel.

THE AMERICAN Bureau of Shipping reported that miscellaneous vessels built to ABS class and delivered in September were a 1600 hp towboat, a 1200 hp dredge, a 680 hp cargo boat, a 1320 hp fireboat and two tugboats, one of 1000 hp and the other of 680 hp. Total horsepower in these boats is 6040.

AN INTERESTING combination personnel boat and tug has been delivered to Gahagan Dredging Corp. of New York by the Gladding Hearn Shipbuilding Corp. of Somerset, Mass. The *Noelle* is a 50 ft vessel of all welded steel construction with a beam of 14 ft and 5 ft 9 in. draft powered by a Caterpillar diesel Model D346 driving a 3-blade 50 in. dia Columbian propeller through a Snow-Nabstedt reverse gear and 3.9:1 reduction gear. The boat has a watertight cockpit that will seat 30 passengers with a fixed canopy overhead to protect them from the weather. There is a glass inclosure at the forward end of the cockpit thus forming a sheltered pilothouse. Although the *Noelle* will be used to transport men to and from the dredge it can also be used for general towing service. The boat has been shipped to extensive dredging operations on the Orinoco River in Venezuela.

THE Pennsylvania Railroad has a new 1½ million dollar inspection and maintenance shop at Morrisville, Pa. for maintenance of diesel locomotives. The old roundhouse for steam locomotives at East Trenton, N. J. has been closed. The new shop 200 ft long, 152 ft wide and 48 ft high is fully equipped for diesel locomotive maintenance including a 30 ton overhead gantry crane.

THERE is a movement on foot in Maine to extend the modern highway system to include a number of islands thru the use of diesel ferryboats details of which have not yet been made public. The plan is to extend the toll road system to the islands by using boats in much the same way that bridges span shorter distances across waterways.

THE Virginia Railroad has ordered an 1800 hp diesel tug for docking ships at its Sewell's Point piers, Norfolk. This is a General Motors tug and at the time of writing no announcement had been made regarding the shipyard building it or the general dimensions.

THE Allis-Chalmers Buda Division has just issued a bulletin No. 203564 describing and tabulating the particulars of their marine diesels and generating sets. While the reading matter is brief and meaty, the tabulated specifications are comprehensive. The bulletin is a good source of reference. It can be obtained by writing to Allis-Chalmers Buda Division, Milwaukee 1, Wis.

THE TOTAL number of diesel boats to ABS class under construction in this country as of October 1, 1956 was 158 diesel with 671,850 hp and 11 diesel-electric with 24,230 hp.

Vice-President Named

The appointment of E. B. Ogden as Vice-President, Equipment Development, of Consolidated Freightways, Inc., was announced recently by President J. L. S. Snead, Jr. Mr. Ogden will be concerned with the maintenance of technical progress in C-F's highway, office and terminal equipment.

Twenty-four years ago, Mr. Ogden joined Consolidated as a mechanic in Portland. Within two years, he was advanced to Shop Manager of C-F's Spokane operation. In 1946, he returned to Portland as Service Floor Manager at C-F's major installation in Portland. Within the next two years, he was moved up to Superintendent of Shops and then to Superintendent of Maintenance for the C-F system. Earlier this year, he was named Director of C-F's progressive research and development program.

For more than 10 years, Mr. Ogden has been prominent in the technical councils of the Society of Automotive Engineers, the American Trucking Associations, the Regular Common Carrier Conference and the Oregon Trucking Association. His numerous papers on maintenance procedures have been presented at S.A.E. conferences across the country. Mr. Ogden is headquartered at Portland.

New Sales Representatives

The Hilliard Corporation, Elmira, N.Y. manufacturers of Hilco lubricating, fuel and industrial oil purifying equipment, filter cartridges and supplies, has announced the appointment of four new sales representatives, according to Mr. T. A. LaBrecque, Vice-president.

Lynn McGuffy Company, 2330 Sul Ross, Houston, Texas, and 304 Sklar Building, Shreveport, Louisiana, will cover East Texas, Southern Arkansas, Northern Mississippi and Northern Louisiana. Ember Products, Inc., 252 Fort Lee Road, Leonia, N. J., is the new representative in Metropolitan New York and Connecticut. C. Arthur Weaver Company, Inc., 403 East Franklin St., Richmond, Virginia, will cover that state. General Equipment Company, 616 Hyde Building, Spokane 8, Washington, will cover Eastern Washington and Northern Idaho.

Opens St. Louis Office

The Sharples Corporation, Centrifugal and Process Engineers, Philadelphia, Pennsylvania, announces the opening of a St. Louis office to serve industries in Missouri, Kansas, Arkansas, southern Illinois, southern Indiana and Kentucky from Louisville west. The new office, which opened on September 1, 1956, is under the direction of Mr. Howard H. Smith, who has been associated with The Sharples Corporation since 1941 in the engineering and sales departments. Since 1950 he has been Assistant Sales Manager.

ACCURATE,
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LUBRICATION
The New 82-V vacuum pumping unit "with dry sight feed," an exclusive Manzel development will end your liquid sight feed problems. Install them on any existing Manzel lubricator. Now — more accurate than ever . . . it will pay you to get complete detailed information on this dependable, field-proven Manzel unit.
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Michigan-Ohio News

By J. W. Brown

WE HAVE received word from the U. S. Army Engineers, Detroit District office that bids have been opened for the proposed deepening of the Amherstburg Channel of the Detroit River as the first phase of the 150 million dollar Great Lakes Connecting Channels project. The apparent low bidder for the contract is Marine Operators, a group of contractors including Al Johnson Construction Company of Minneapolis, Peter Kiewit Sons Co. and Cunningham Kiewit Co. of Omaha, and Morrison Knudsen Co. of Boise, Idaho, with a bid of $18,338,-145. Probabilities are that this project will entail a great deal of Diesel Marine equipment and we will report on it in DIESEL PROGRESS later.

THE CITY of Lansing, Michigan has purchased from the Earle Equipment Company, Detroit, a model HD-16 Allis-Chalmers crawler tractor. Equipped with a bulldozer, cable control unit and powered by an A-C model HD-844 Buda diesel the crawler will be broken in on a sanitary land-fill operation.

MACK Motor Truck Corporation located in Dearborn, Michigan has delivered *ten* B-61P Thermodyne Mack diesel trucks to Sentle Trucking Corp., in Toledo, Ohio. Sentle Trucking will put them to work hauling steel.

THREE model 315 Ingersoll-Rand air compressors powered by GM 3-71 Detroit diesel engines have just recently been delivered to Aurora Gasoline by the R. G. Moeller Company of Detroit.

CUMMINS Diesel Michigan, Inc. has installed a Cummins NHRBIS-600 diesel in a Northwest shovel for Huron River Quarry Inc., located in Flatrock, Mich.

BRACKNEY and Wanty, located at Ypsilanti, Mich., have just purchased from the Detroit branch of Wolverine Tractor & Equipment Co., a new IH TD-18 equipped with a hydraulic bulldozer and driven by an International Harvester diesel engine.

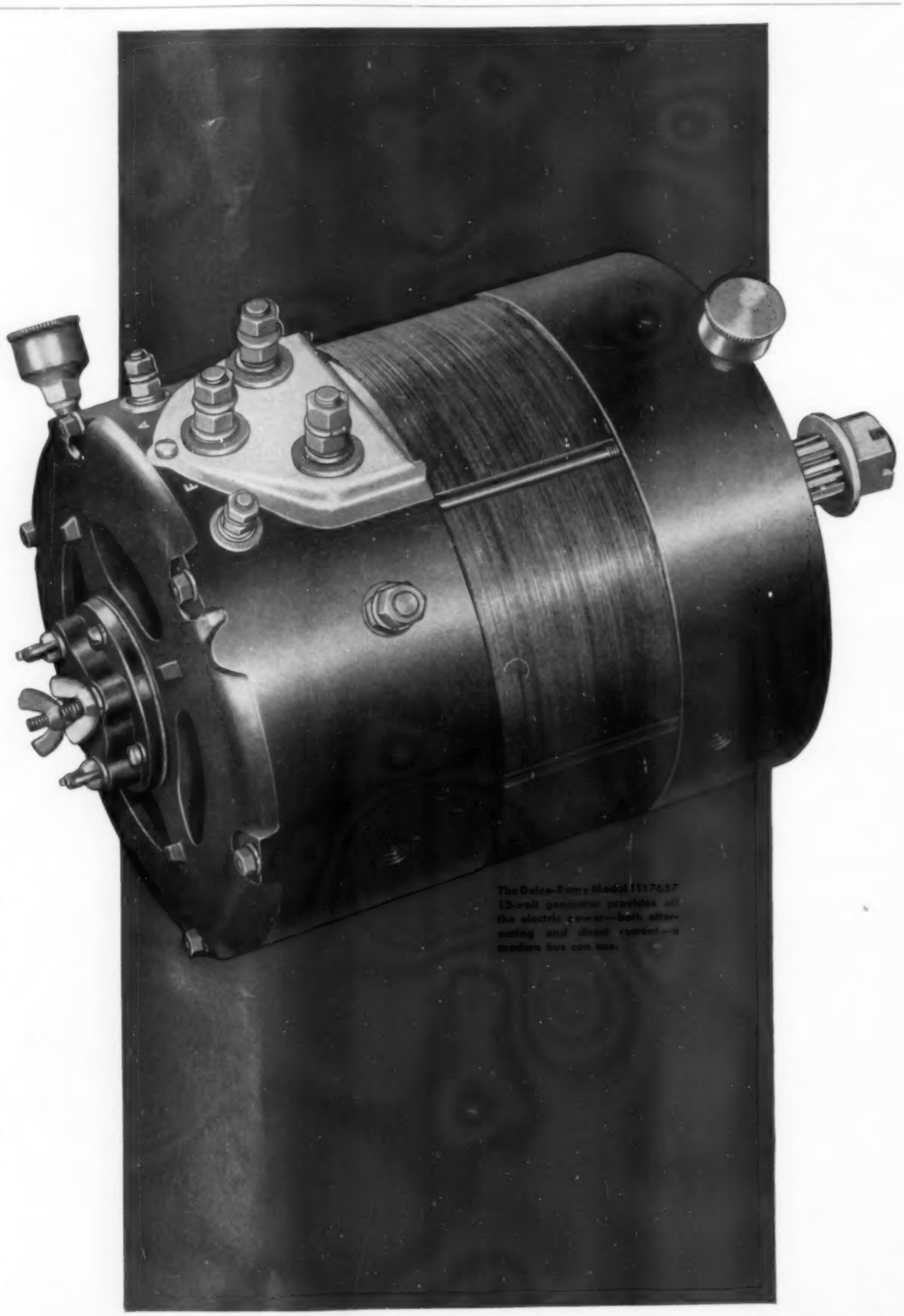
MICHIGAN Tractor & Machinery Co. of Detroit have delivered a new Caterpillar D-7 crawler tractor to the Fattore Company located in Detroit. The Cat is driven by a model D339 Caterpillar diesel and is equipped with a hydraulic straight blade.

THE EARLE Equipment Company of Detroit has sold an HD-21 Allis-Chalmers crawler tractor powered by an A-C Buda and equipped with a hydraulic coal blade. The new tractor is going to the Public Lighting Dept., City of Detroit and will help keep the lights bright in the Motor City.

CUMMINS Diesel Michigan, Inc., has installed a JT-6-B Cummins diesel replacing a JBS-600 Cummins in a Diamond T truck. The people at Cummins Diesel have related to us that the older model diesel had been run 240,000 miles without an overhaul. The truck, incidentally, is owned by Mr. Russell Rose of Grand Rapids, Michigan and is used to haul produce between Michigan and Florida.

AN HUD Hough Payloader powered by a Hercules diesel (model DIX 6-272) and equipped with a 1 yd bucket has just been delivered by Wolverine Tractor & Equipment Co., of Detroit and Grand Rapids, Michigan to the City of Troy, Mich.

MICHIGAN Tractor & Machinery Co. of Detroit has just delivered *three* Caterpillar DW21 low-bowl scrapers and *two* Caterpillar D-9 crawler tractors to the Holloway Construction Company located in Livonia, Mich. Holloway Con-



struction is working on a new Ford plant in Lorain, Ohio and is using approximately 45 pieces of Caterpillar equipment, all purchased from Michigan Tractor.

GREAT Lakes Steel Corp. is breaking in a new TL-12 Tracto-loader purchased from the Earle Equipment Co. of Detroit. The TL-12 is driven by an A-C Buda (model 6TA-273) diesel and will be operated by Great Lakes Steel around the blast furnaces.

FOR powering an International Harvester truck Cummins Diesel Michigan, Inc., is installing a model NTO-6-B for Mr. Edward Drew of Utica, Mich.

PENINSULAR Diesel, Detroit, has installed a model 4055C GM Detroit diesel for the Saginaw Asphalt Company. The new diesel is replacing an older gasoline engine in a P & H shovel.

THE EARLE Equipment Company of Detroit has delivered an Allis-Chalmers HD-11B crawler tractor equipped with a hydraulic bulldozer and cable control unit, and driven by an A-C Buda diesel. The delivery was made to Missaukee County Rd. Commission of Michigan.

PENINSULAR Diesel, Detroit, has recently installed a model 4058C GM Detroit diesel in a FWD truck for the Presque Isle County Road Commission in Michigan.

A MODEL 99L Austin-Western grader with a GM 4-71 Detroit diesel was delivered to the City of Detroit by R. G. Moeller Company.

THE DOW Chemical Company of Midland, Michigan has accepted delivery on a Caterpillar D-4 crawler tractor. Purchased from Michigan Tractor & Machinery Company the new Cat is equipped with a hydraulic angle blade.

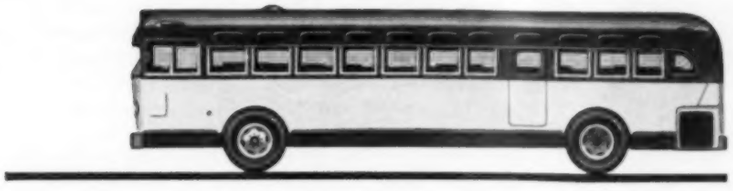
THE BROWN Brothers, Lansing, Michigan have a new 80 kw trailer-mounted portable generating plant powered by a model 4150 GM Detroit diesel. The unit was sold by Peninsular Diesel of Detroit, and will be used to supply power for various bridge building jobs.

TWO Ingersoll-Rand model 600 air compressors run by GM 6-71 diesels have been delivered to Mancini Construction Co. of Detroit by the R. G. Moeller Company, Detroit, Mich.

PENINSULAR Diesel, Detroit, has sold to the D. and J. Gravel Co. of Howell, Michigan a model 12-103 Twin 6-71 GM Detroit diesel. The Twin 6-71 diesel will be put into operation on a new Pekor Gravel Pump.

Cleaning Machine

A new parts and motor block cleaning machine for diesel shops is the Model 236-SM, manufactured by Storm-Vulcan, Inc., Dallas, Texas. This machine has four motor-driven impeller type agitators mounted on the sides of the tank. This method of impeller mounting allows the full force of tremendous agitation to reach every corner and surface of parts being cleaned. There are no dead areas in the unit according to the manufacturer. Other advantages are the increase of solution life to 4-times normal use, faster cleaning, and the complete freedom from grit, metal particles, and contaminants in the oil lines and cavities of parts and blocks. The inside working area of this machine is 72 in. x 36 in. with a solution depth of 36 in. Turbo-Blast Cleaning Machines are also available in sizes for every cleaning requirement in engine rebuilders, automotive and diesel maintenance shop. All standard type detergent can be safely used in this machine. Completely illustrated description and operating information is available from Storm-Vulcan, Inc., 2225 Burbank St., Dallas, Texas. (ITS NEW)



ASK FOR DELCO-REMY MODEL 1117657—THE GENERATOR THAT HANDLES THE TOUGH JOBS WITH EASE!

This Delco-Remy 12-volt generator—Model 1117657—is the heart of an A.C.-D.C. charging system designed specifically for buses with continuous and extremely heavy electrical loads. It has a low cut-in speed of about 550 rpm, a curb-idle output of 130 amp., and a maximum output of 180 amp. at approximately 2000 rpm. Physically, it is rugged yet extremely low in weight for such a tremendous output. With its matching regulator and rectifier, Model 1117657 will give you all the power a modern bus can use—alternating current for fluorescent lighting, plenty of direct current for other electrical equipment. Specify Delco-Remy A.C.-D.C. charging systems for your buses. They're typical of Delco-Remy leadership in the automotive electrical field.

GM GENERAL MOTORS

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ELECTRICAL SYSTEMS

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Inland River Reports

By A. D. Burroughs

FEATURE item of inland river interest in recent weeks was the 61st annual meeting of Ohio Valley Improvement Association held in Cincinnati, with many of the diesel representatives on hand from every section of the nation.

WHAT MIGHT be called a launching landslide took place recently at St. Louis Shipbuilding and Steel Company, with four days seeing the launching of three new vessels for inland river duty. It was lead off by the new *Ovec*, another new Ohio River Company towboat, with its 3,240 hp provided by Baldwin-Lima-Hamilton engines, now in active service in the Ohio River coal trade.

THE *Larry Turner* followed the next day, with the official christening ceremonies held later when Miss Sue Turner officially named the towboat for her father, Lawrence C. Turner. The 124 ft vessel is in operation for Hutchinson Barge Lines with the rated 1800 hp developed from GM (Cleveland) engines.

TWO DAYS after the Turner launching came the second craft for Ohio River Company fleet—the single-screw *Des Plaines*, destined for Illinois River service.

AN ABUNDANT number of new vessels are appearing on the inland rivers with the *Cecilia R.*, a new towboat making her appearance in the Ohio gasoline traffic. Owned by East-West Towing Co., built by Calmes, two Caterpillar engines provide the 900 hp.

THREE Cummins Model VT12M engines supply the 1800 hp for the *Etta Marie*, new towboat now on water trials for owner Port City Towing Co. Complete with modern river aids and luxury, this neat 76 x 26 x 8.5 ft vessel has a hull and superstructure built at Greenville Manufacturing and Machine Works, with completion work done by Marine Welding and Repair Works (Miss.).

ANOTHER new one spotted is the 102-footer, the modern towboat named *Cindy Jo* built for Rose Barge Lines, Marseilles, Ill., by Calumet. Two Superior engines from White Diesel Engine Division of White Motor Company provide the rated 1600 hp.

NOW OUT on water trial test runs is the new mv/*Dispatcher*, the V-bottom craft designed by the Deering firm for Dispatcher, Inc., recently completed at Sturgeon Bay Shipbuilding and Dry Dock Co. Measuring 89 ft-6 in., x 24 ft, the power is provided by a pair of 675 hp Enterprise engines.

A NUMBER of favorable comments have come in on the new towboat, *Jag*, built by McMillan Supply Co., (Greenville, Miss.) for the KGW Towing Co. Measuring 73 x 24, two Caterpillar Model D397 turbo-charged engines, each rated at 500 hp each provide the power.

A NUMBER of new vessels will be added to this group of modern diesel vessels just entering the inland river service, with the *Glo-Cat* expected to make its appearance around the first of the year. Built by John Cox, Delta Barge Lines, the 50 x 16 ft craft will go into the New Orleans area for service with power from the two Caterpillar engines, model D337, rated at 310 hp.

AT CALUMET Shipyard, Chicago, the tug *Spartan* was scheduled for delivery in late December for the famous James McWilliams Blue Line, Inc., New York. Designed for New York harbor duty, the 2,000 hp will come from a single GM (Cleveland) engine.

A NEW fleet addition for Superior Towing Company on schedule is under construction at Marine Welding and Repair Works, with the new towboat to carry the name *William L. Lyon*. Measuring 100 x 30 ft, two 900 hp GM model 12-567 engines will supply the power for the new vessel.

ALL EYES are turned toward Nashville Bridge Co., where the 4,125 hp towboat is to make its first public appearance near the first of February. This triple-screw boat, measuring 130 x 40 ft, ordered by Indian River Lines, Inc., Wilmington, Del., will carry the name *Toltec*, with three Enterprise engines, each developing 1,375 hp, to provide the power for this powerful craft.

FAITHFUL fans of the faithful diesel towboat, *Tom Sawyer*, will be pleased to know that the towboat is now the flagship of Gulf Coast Towing Company, Inc. Recently purchased from Federal Barge Lines, this towboat was built in 1933, with the total 1180 hp developed from McIntosh & Seymour diesels.

MASCO II, another well-known river vessel, has been purchased from Material Service Corp., Chicago, by Daniel Gilbert, La. Measuring 110 x 26 ft, the 800 hp is provided by a pair of Fairbanks-Morse engines. Many folks remember this one as the *North Star*, built by Nashville Bridge Co. in 1925!

APPRECIATION is expressed for the fine photo of the 76-ft tug, *Chinook*, owned by Shaver Transportation Co. This 14-knot tug is a busy craft on the Columbia River, with power from Cooper-Bessemer engines.

Plant Expansion

Winslow Engineering and Manufacturing Co., manufacturers of fuel and oil filters and elements, has doubled production facilities at its Murray, Kentucky plant, according to President L. L. Moore. The company has occupied additional buildings for manufacturing and warehouse space and will concentrate element production at Murray. Headquarters for the company, and for full-flow filter production, remain at Oakland, California.

Mexico Locomotive Purchase

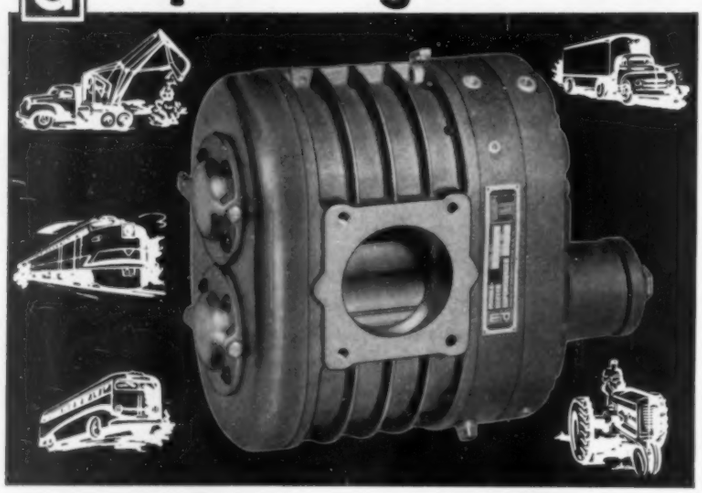
National Railways of Mexico has purchased ten diesel-electric locomotives for mainline passenger and freight service from General Electric at a total cost of $1,943,590. Purchase of the units is part of a modernization program of the National Railways. The locomotives will be the most powerful of the universal standard line recently developed by G-E's Locomotive and Car Equipment Department here for export.

The order, placed through the International General Electric Co., came after a five-week trial in Mexico by two demonstrator models. Nearly 16,000,000 gross ton miles were piled up by the two locomotives working both coupled together and individually during the five-week period. This was accomplished with 509 hours of actual train operation.

The trial saw the units performing passenger and freight service over most of Mexico. Railroad officials and G-E service personnel said the locomotive performance and maintenance were very satisfactory. The ten units, which will be delivered in about a year, will be the first road-type General Electric locomotives to operate in Mexico.

The engine is a turbosupercharged, four-cycle V-12 Cooper-Bessemer diesel. The

DIESEL ENGINES NEED
Supercharged Power



MIEHLE-DEXTER SUPER-CHARGERS
INCREASE HORSEPOWER, TORQUE,
ACCELERATE YOUR ENGINES FASTER

Wherever Diesel engines work—buses, tractors, trucks—a Miehle-Dexter Supercharger adds a big boost to performance. Power is increased by the simple addition of this compact, space-saving supercharger. That means *extra* speed at any load, *extra* pushing or pulling power at any speed, wider speed range. More, it means faster acceleration with less smoke. Add all this to engines without increasing size, weight or cost. In fact, weight per horsepower is decreased. Standard M-D models available for most engine applications. For more facts, call or write Miehle-Dexter.

Soon available AN ENTIRELY NEW TYPE OF TURBOCHARGER

MIEHLE DEXTER
Supercharger Division of
The Christensen Machine Co.
116 Fourth St., Racine, Wisconsin

locomotive has two trucks and four standard traction motors. The engineman's cab is located between the engine and steam generator cabs, and the controls are on the right side in operation with the steam generator cab leading. Outside hand rails side and end steps are provided, as they are in the other eight models of G-E's universal line. The first diesel-electric locomotives ever put into service in Mexico were two 300-hp units built by G. E. in 1939. They are still in service. Also still operating is Mexico's first electric locomotive, built by General Electric in 1924.

Engine Literature

Nordberg two-cycle 21½ in. bore diesel and Duafuel engines are the subject of a new 20 page, three color bulletin which has just been published by Nordberg Manufacturing Company, Milwaukee 1, Wisconsin. Operating advantages and overall economy features of the Nordberg Type TS-21 engine are outlined in Bulletin 245. Long experience with the burning of heavy fuel oils and the pioneering development of two-cycle dual fuel operation are offered as evidence of the engineering design features of these Nordberg engines.

The simple port scavenging system which Nordberg employs is shown in a cutaway view of a power cylinder. An annotated cross section view through the entire type TS-21 engine and pictures of its major component parts illustrate the construction features of this engine.

The method of power cylinder lubrication and the fuel injection system are also pictorially presented. Photographs of typical Nordberg two-cycle diesel engine installations in utility and industrial electric power generating plants around the world are included throughout the colorful, informative brochure. Bulletin 245 is available free upon request. (ITS NEW)

Long Mfg. Promotes Two

Howard E. Blood, Jr., until now manufacturing manager of the Detroit Gear plant of Long Manufacturing Division, Borg-Warner Corp., has been appointed administrative assistant to the division president, T. J. Ault, president and general manager of Long, announces. In his new post Blood will coordinate activities of the industrial relations, purchasing, quality control, research, and product engineering departments, reporting directly to Ault.

Blood was first employed by Borg-Warner in 1949. He served with the Norge Division as assistant to the vice-president of manufacturing, and later with Norge Heat Division, before joining Detroit Gear. A Cornell University graduate in administrative and mechanical engineering, Blood resides with his family at 1227 Bishop Road, Grosse Pointe Park, Mich.

Blood's former duties at the Detroit Gear plant will be taken over by W. E. Rowe, manufacturing manager of Long, who now assumes full responsibility for manufacturing in all plants of the division. Rowe has been with Borg-Warner since 1927, mainly in production supervisory capacities at Detroit Gear.

Home Study School Accreditation

Since more students enroll each year in private home study schools than enter the freshman classes of all colleges and universities, it is important that the public have reliable information on reputable, worth-while home study schools —schools in which the public can be confident of receiving good instruction at a fair tuition. A forward step in this direction has been the setting up of an Accrediting Commission and Examining Committee by the National Home Study Council, the standard-setting agency for private home study schools for thirty years. Accreditation means that each school accredited has met certain rigid requirements. It has made an intensive study of its own operation, opened its doors to a thorough inspection by an outside Committee, supplied all pertinent information required by the Accrediting Commission, and submitted its instructional material for a thorough review by competent subject-matter specialists. The Accrediting Commission and Examining Committee was made up of 14 educators from high schools, colleges and universities; 7 members from state and federal governmental bodies; 8 representatives from commerce and industry; and 5 members from the home-study field.

Accreditation also means that the school has a competant faculty, offers educationally sound courses, admits only qualified students, provides satisfactory educational services, has demonstrated ample student success and satisfaction, charges reasonable tuition, truthfully advertises its courses, and is financially able to deliver a high quality of educational service.

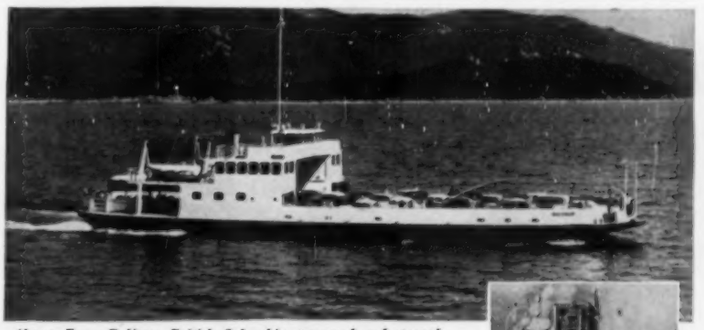
To celebrate its accreditation, Utilities Engineering Institute, Chicago, recently held an Open House at which over 300 guests were welcomed. After a tour of the School's classrooms and various training shops, including the diesel student facilities, the guests partook of a buffet lunch and refreshments. Among those who sent in acceptances of invitations were John W. Duncan of International Harvester Company; John Hanley, Cummins Illinois Engine Sales; and Frank M. Childs of the Commonwealth Edison Company. Dr. Homer Kempfer, Director of the National Home Study Council, struck the keynote of accreditation when he recently stated, "With so many people enrolling, it is highly important for the public to know which schools are worthy of confidence. It is heartening to realize that over fifty percent of the enrollment is in accredited schools."

Transverter Bulletin

An eight-page, fold-out bulletin describes the new Transverter power train package designed by the Transmission Division of Clark Equipment Company for off-highway and stop-and-go service. The bulletin emphasizes the compact size, simple trouble-free components, easy installation and long service life of the unit. The three major components—torque converter, disconnect clutch and transmission—are illustrated. There is also a cutaway diagram of the assembled unit. Specifications and dimensions included in the bulletin indicate that it is rated for engine torque up to 325 lb-ft and that it is only 8 in. longer than a conventional transmission and clutch.

According to the bulletin, the unit is particularly suitable for equipment such as house-to-house delivery trucks, busses, garbage trucks and various types of construction equipment and it can be installed by an equipment manufacturer without a major re-design of the line. The bulletin, No. TV-100, is available from Transmission Division, Clark Equipment Company, Jackson, Mich.

Supercharging is the accepted method of souping up an engine without which very few engines are built these days. That seems to be in some way related to the fact that you have to work less if your engine is made to do more work.



Above, Ferry Balfour, British Columbia, powered and steered with two Harbormasters.

Catherine Graham, showing Harbormaster elevated for inspection.

Harbormasters are ready answer to many tough marine power and steering problems

these heavy duty outboard propulsion and steering units are a complete package, compact and easily installed

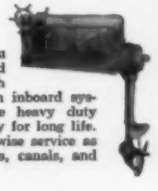
Quickly and easily installed

Harbormasters are assembled and tested at the plant and are ready for immediate use on barges, ferries, fishing craft, tows, lighters, dredges, etc. In many cases Harbormasters can be installed and ready to go merely by mounting with four hold-down bolts. Even on largest units, only fuel tanks and controls are installed separately.

Outstanding maneuverability

You have 360-degree maneuverability and can dock or maneuver in crowded quarters, stay headed into the current on sharp river bends or in tide rips, run into locks without losing time, shunt or pick up barges with precision, or reverse with full power.

Rugged-Powerful



With these outboards you get more actual delivered thrust per H.P. than with the same engine with an inboard system. Harbormasters are heavy duty equipment, built ruggedly for long life. They are ideal for coastwise service as well as in harbors, lakes, canals, and rivers.

Easy service and maintenance

Special 180° elevating mechanism allows one-man operator to raise entire submerged assembly to any degree he desires. No dry docking or diving is necessary for repairs.

Shallow water protection

In shallow water, shear pin lets tail section ride up and over submerged obstacles. Shear pin is easily replaced while underway. If desired, the unit can be operated with tail section in partially elevated position to reduce draft.

Models and installations to meet your needs

Four series are available with models ranging from 40 to 400 h.p. All are designed for installation on existing powered or unpowered craft and on new craft of all types. In many cases the installation can be made with no alterations to the hull whatever.

Harbormaster Outboard Propulsion and Steering is the money-saving way to solve many tough marine power and steering problems. Recommendations are available without charge, based on hundreds of installations. Send for New Catalog giving complete information and showing many Harbormasters in action.

MURRAY & TREGURTHA, INC.
6 HANCOCK STREET
QUINCY 71, MASSACHUSETTS

Midwest Diesel News

By L. H. Houck

KANSAS CITY Public Service Co., in its conversion from electric trolleys to diesel busses, has been authorized by PSC to buy 67 more GMC air-suspension units for $1\frac{1}{2}$ million. Last July it placed 30 of these units in service on its 12th Street line and in October converted the Troost Ave. line from steel to rubber. The 51-passenger busses are powered with GMC 2-cycle diesels. They cost about $23,000 each and are equipped with an air-suspension system which uses metered air to make the unit self-leveling regardless of position of load.

WELLS CARGO, Inc., Reno, Nev. has added 10 Kenworth Model 825 units powered with Cummins NTO 262 hp Turbodiesels. Trucks have aluminum frames, cabs, running boards, battery boxes and fuel tanks and Kenworth's torsion spring tandem axle drive.

BARNES & FRYE, Topeka, Kan., recently opened a new sand plant operation to dredge sand from the river. Main unit is an 8-in. McClanahan dredge pump, powered with a Caterpillar diesel from Martin Tractor Co., Topeka.

AN ALLIS-CHALMERS HD-11-B tractor with loader has been delivered to Schaefer & Schaefer, Salem, Mo., by the Chiles Tractor and Machinery Co., Springfield, for use in custom work.

SCORE for Mack B-65LT diesels added during 1956 by Mid-States Freight Lines, Chicago, now totals 50 units.

GIBBONS & REED, Salt Lake City, built their own gravel plant recently and powered it with a 165 hp HRP-600 Cummins diesel from Cummins Intermountain Sales, Salt Lake.

SALES of the Pettibone Speedall tractor shovel which features a GMC diesel and an Allison torque converter, has been steadily climbing according to reports from dealers who have been conducting demonstrations throughout the Midwest this summer and fall. Some of the centrally located dealers are: Machinery, Inc., Springfield, Ill.; Seastrom & Co., Indianapolis; Eighmy Equipment Co., Rockford, Ill.

NEW SOUTHERN Illinois distributor for LeTourneau-Westinghouse equipment and Adams graders, is the 13-year-old firm of John Hutton Supply Co., Marion. John Hutton is head of the firm which also handles American tractors and Marion power shovels.

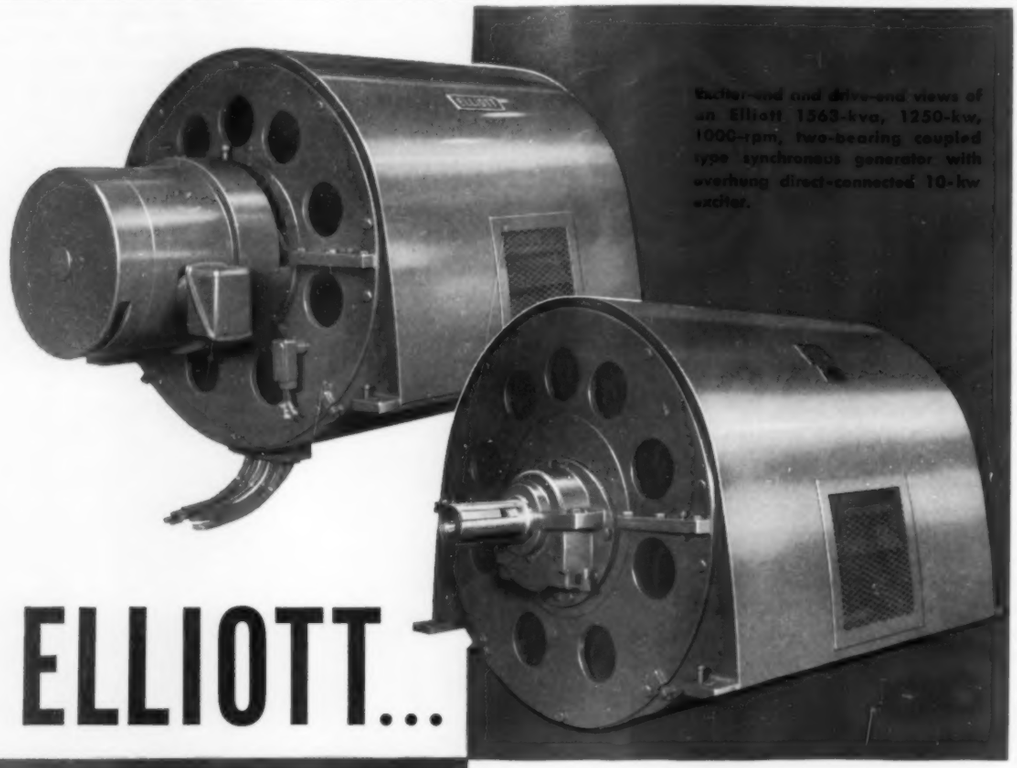
GRAVEL CONTRACTOR, Willard Black, Joplin, Mo., has added an Allis-Chalmers HD-6-G tractor to his equipment. Chiles, A-C dealers in Springfield, made the delivery.

MARTIN MACHINERY Co., Topeka, recently delivered two Caterpillar 75-kw generator sets to Caddo Oil Co., Chanute, Kan., equipped with extra filters so crude oil direct from the well can be used as fuel.

DELIVERY of approximately $2 million worth of International tractors equipped with Cummins diesels, has been completed to the Spector Freight System, Chicago, which is now fully dieselized.

PERRY JONES, Carbondale, Kan., rock producer, has bought two D9 Caterpillars to be used for stripping on the Toronto Dam job at Toronto, Kan. Delivery was made by Martin Machinery Co., Topeka.

DIRT IS MOVING on the $415 million, 193.3-mile Northern Illinois Toll Highway, mostly by diesel. Main activity is near Rockford where an important array of Allis-Chalmers No. 360 scrapers, Caterpillar DW 21's, International 2T75



Exciter-end and drive-end views of an Elliott 1563-kva, 1250-kw, 1000-rpm, two-bearing, coupled type synchronous generator with overhung direct-connected 10-kw exciter.

ELLIOTT...

ANNOUNCES A NEW LINE OF HIGH-SPEED A-C GENERATORS

An Elliott 1413-kva, 1130-kw, 900-rpm, single-bearing, coupled type synchronous generator with stub shaft extension for a belt-driven exciter.

FEATURING NEW FLAT BEARING BRACKETS of rigid plate construction. These brackets assure vibration-free operation and yet are lightweight for ease of handling during maintenance operations. The split construction of the bracket permits quick removal of the upper half for periodic inspections. The large holes provide easy access to generator collector-ring brushes and permit unrestricted flow of ventilating air into the machine.

There are a variety of frame enclosures available with either one or two bearings of the ring- or pressure-lubricated type. The frame design minimizes the possibility of recirculation of ventilating air through the machine.

For complete information, consult your local Elliott field engineer or write Elliott Company, Ridgway, Pennsylvania.

ELLIOTT Company

STEAM TURBINES • MOTORS • GENERATORS • DEAERATING HEATERS
EJECTORS • CONDENSERS • CENTRIFUGAL COMPRESSORS • TURBOCHARGERS • TUBE CLEANERS • STRAINERS

Payscrapers and TD-24 tractors, LeTourneau-Westinghouse with Cummins, are making time against winter shutdown.

MORE AND MORE units of Lee-Way Motor Freight, Oklahoma City, with the Mack Thermodyne diesel engine, are being seen on their Mid-West routes.

BRIDGES CONST. CO., Springfield, Mo., general construction contractor, has added an Allis-Chalmers HD-6 to his equipment from Chiles Tractor and Machinery Co.

COLUMBIA CONST. CO., Indianapolis, Ind., has repowered a No. 604 Lima crane with a 200 hp HIS-600 Cummins diesel from Cummins Diesel Sales Corp., Indianapolis.

CHILES, Springfield, sold an Allis-Chalmers HD-6G and an HD-6-B to Roy Worthington, Hermitage, Mo., for custom work, farm ponds, terracing and construction work.

EGERER-GALLOWAY, Milwaukee, recently repowered a Bucyrus-Erie 28-L spudder with a 110 hp HRCIP-400 Cummins from Cummins Diesel of Wisconsin, Inc.

Argentine Railways Buys

Argentine State Railways has ordered approximately $5½ million worth of diesel-electric locomotives from General Electric as part of an extensive revamping of that country's rail system. The order is for 25 locomotives of a new universal type recently developed by the Company's Locomotive and Car Equipment Department here for use on railroads all over the world. Rated at 1800 hp the units are the largest of nine universal models offered by G. E. for main-line passenger, freight and switching service. They will be built for operation on wide-gage tracts. They are powered with Cooper-Bessemer diesels.

The contracts were placed through the International General Electric Co. Delivery of the 40 units to Argentina will be complete in early 1958. They will join 100 other G. E. diesel-electrics that have been put into service there since 1947.

Distribution Panel Board

A new heavy-duty power distribution panelboard incorporating rigidly mounted fusible switch units of the quick-make, quick-break type has been announced by the Distribution Assemblies Department of the General Electric Company. The new panelboard is designed for 600-volt a-c maximum service, 2- or 3-wire, single-phase, and 3- or 4-wire, 3-phase applications. Known as the Type QMR, it can be safely operated in systems having short-circuit capacities up to 100,000 amperes RMS asymmetrical when current-limiting fuses are used.

The fusible switching devices used in the new design are each individually enclosed in a protective steel compartment. An interlocked cover can be opened only when its handle is in the OFF position. The units are of modular construction to permit ready interchangeability, and can be provided in ratings of 30 to 200 amperes, 2- and 3-pole construction. Units are horsepower rated for both standard and time delay fuses. The new panelboard is listed by Underwriters' Laboratories, Inc.

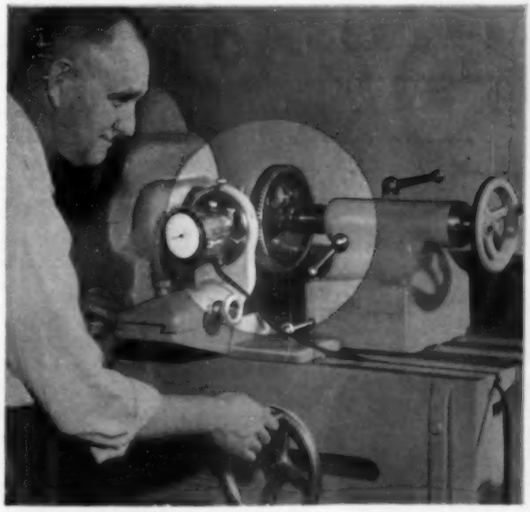
NOW AVAILABLE! The Completely new Volume 21 of **DIESEL ENGINE CATALOG.** This giant, fully illustrated reference book containing complete and detailed engine and accessory sections is bigger, better than ever before. Mail orders are now being filled for this "Bible of the Industry," which has been revised, rewritten and brought up to date completely from cover to cover. Orders are being accepted for this limited edition, which costs $10 postpaid plus California sales tax where applicable. Send checks or company order forms to **DIESEL PROGRESS,** 816 N. La Cienega Blvd., Los Angeles 46, California.

GM

DETROIT DIESEL PARTS

—factory-engineered for long life, low-cost service

Camshaft inspection—Close adherence to engineering specifications on every General Motors Detroit Diesel replacement part is maintained by routine checks with high precision instruments like this optical inspection gauge with a guaranteed accuracy in millionths of an inch.



Gear dimension control—Gear teeth shaving is measured precisely on the latest-type machines where tape recordings show the contours to an accuracy of one ten-thousandths of an inch.

Magnetic analysis comparator—Here the latest electronic testing equipment is used for a uniform, rapid method in checking metal parts for strength . . . customers' assurance of utmost dependability.

You're always money ahead when you buy factory-engineered parts from your Distributor or Dealer

GM GENERAL MOTORS DIESEL POWER

DETROIT DIESEL

Engine Division of General Motors

Detroit 28, Michigan

Single Engines . . . 30 to 300 H.P. Multiple Units . . . Up to 895 H.P.

America's Largest Builder of Diesel Engines

Tractor Does Extra-Duty

By adding a custom-built boom to a standard rubber tire, coal handling tractor, Indianapolis Power & Light Company has created a unit which does double and triple duty. Assigned to the company's 271,000 kw White River Generating Station in Martinsville, Indiana, the tractor not only handles its normal job of dozing and pushloading coal handling scrapers, but also does scattered maintenance and service work around the plant. The electrically operated boom is built to function without hampering the normal use of the dozer blade. When not in use it folds back out of the way. When extended it provides a crane which will lift a weight of 3 to 4 tons at a reach of 10 to 14 feet out ahead of the tractor. Functioning in this way it extends unit's usefulness in handling special assignments.

One of the most important of these extra jobs is the task of unloading chlorine for purification of water used in the power generation process. Because this material arrives at the plant in 3000 lb cylinders on railroad flat cars, it posed an unloading problem. Shipments were not frequent enough to justify keeping specialized unloading equipment at the generating station permanently. As a result it was necessary to bring equipment from Indianapolis, 26 miles away, each time a new supply arrived. Now, with the boom attachment this is no longer necessary. The tractor easily handles cylinder unloading between other jobs. Additional operations handled by the boom include loading and unloading heavy supplies and materials from trucks and pipe handling involved in repairing and extending the plant's ash disposal line.

The design of the boom was originally conceived by James Lohr, superintendent of the White River Generating Station. With the assistance of members of the Field Engineering Department of LeTourneau-Westinghouse Company, Peoria, Illinois (manufacturers of the rubber tire dieselized Tournatractor on which it is fitted) problems were worked out and the design set down on paper. The Indianapolis, Indiana distributor from whom the tractor was purchased, handled the actual fabrication and installation of the boom. The crane is unique in that it is self-erecting and can be extended or folded back by a touch of an electric switch in the tractor cab. An important consideration in its design is that at no point does it interfere with the normal tractor functions either from an operational or maintenance standpoint.

You can count on efficient, expert service for your Quincy Compressors from any of the more than one hundred Quincy Authorized Service Depots across the country. Adequate stocks of genuine factory parts are maintained for every model in the Quincy line. And because Quincy service people realize the importance of air power on your job, you can be sure of service-plus when you need it, where you want it. Depend on Quincy Compressors and Quincy service for all your needs from 1 to 90 CFM. Write Dept. K-53 for catalog today.

Quincy COMPRESSORS

FOR LOW COST AIR POWER

QUINCY COMPRESSOR CO., QUINCY, ILLINOIS

Temperature Controller

A new series of differential expansion type temperature controllers has been announced by Burling Instrument Company. Called the Models F-1C, F-2C, and F-3C, this series includes several new features and offers modifications which permit use in a number of applications. These include accurate on-off temperature control of heating operations, processes, equipment, etc., safety alarms and cut-outs on similar installations, and combinations of control and alarm. The choice of one, two, or three snap-action switches on any instrument makes many unusual installations possible. Temperatures from sub-zero to 2000°F can be handled without difficulty; adjustable ranges as wide as 1200 degrees in one instrument are offered.

Operation is by the difference in expansion of two concentric tubes when exposed to heat. The resulting movement is multiplied through a lever arrangement which actuates one or more switches. Standard switch rating is 15 amp, 125-250v, AC, but higher ratings are available. All cases are weathertight and may be used in outdoor locations. Temperature adjustments are all made externally, but two styles offer choice of knob with pointer for easy adjustment and socket head set screw where tampering must be discouraged. Units are for local mounting and may be furnished with flanged or threaded fittings. For futher information write Burling Instrument Company, 16 River Road, Chatham, New Jersey. (ITS NEW)

Gas Compressors Modernized

Through the application of compressor cylinders built of nodular iron, older type horizontal type compressors can now be converted to handle 2000 psi for modern transmission and gas storage service. This accomplishment has already been realized at the Rockport and Ripley compressor stations of United Fuel Gas, Charleston, West Virginia. The compressor cylinders designed for 2000 psi service are supplied by The Cooper-Bessemer Corporation for its own Type 22 units. They are one of the first of their kind to be constructed of nodular or ductile iron.

Previous to this time, compressor cylinders built of cast iron have been limited largely to 1000 psi service. Cast steel cylinders have been used where pressures up to 2500 psi were anticipated. One of the first engine and compressor builders to be licensed to use nodular iron, Cooper-Bessemer has been adapting this metal to vital engine and compressor parts.

Each of seven horizontal type compressors at the Ripley and Rockport Stations is equipped with the nodular cylinders. The cylinders are a two-volume design, permitting 19 steps of unloading per compressor. Exceptional flexibility of operation can thus be obtained to accommodate extreme variations in pressure ranges. With the two volume compressor cylinders, gas to storage can be handled at 620 to 685 psi suction and 1000 to 1800 psi discharge. Delivery out of storage is handled at 300 to 700 suction and 800 to 1500 discharge. The modernization of these compressors includes installation of Woodward type PG hydraulic governors. With the new governors, smooth start up, smooth speed variation and positive control are better accomplished to simplify the operations of the stations. (ITS NEW)

Booklet on Moly Steels

Moly Steels for Cast Gears, a four-page booklet explaining the advantages of molybdenum alloys which permit reduction in size and weight of cast-steel gears, has just been published and is available from Climax Molbdenum Company, 500 Fifth Avenue, New York 36, N. Y. The booklet explains that of the thousands of cast-steel gears made daily, increasing numbers are being made of alloy steels. This is because alloying elements increase the hardenability of the metal, making possible higher strength and toughness in moderate and large size gears than can be attained with carbon steel.

Of the many alloy compositions used by foundries, those containing molybdenum are popular because of their efficiency and economy. Moly is not lost through oxidation; hence more accurate alloy control is possible. Recovery of moly in scrap, moreover, is exceptionally high. It is easy to use, requiring no change in accepted foundry practice. And it can be introduced in the ladle as well as the furnace, making it possible to obtain alloyed and unalloyed types of castings from a single heat. Moly also permits use of higher temper-

ing temperature for a given hardness and strength. Because moly reduces or eliminates temper brittleness, liquid quenching after tempering to avoid embrittlement is unnecessary.

Lapping Machine

Higher capacity, handling of larger parts and other desirable advantages in precision production lapping operations are provided in a new 36-in. Model Lapmaster Lapping Machine. Inside diameter of the conditioning rings is 14½-in., thus permitting handling parts up to that size. Capacity-wise, the machine will take well over twice as many 1-in. parts as the 24-in. model. The roller bar attachment has been designed to provide the operator with shelf space for placing pressure plates or fixtures. The drain hole on the 36-in. Lapmaster is on the side, and a wiper blade is fastened to the underside of the base table to bring all of the spent compound into the drain. A rubber hose, fastened to the drain plug, allows a container to be placed under the machine and conveniently out of the way.

A fork style agitator is placed at a 30° angle in the agitator tank. This has been done to facilitate mixing of abrasive when left loaded in the tank for an overnight period. This eliminates strain on the agitator motors. Lapmaster Lapping Machines are capable of generating surface flatness to less than one light band and finishes to 2 RMS in short or high production runs. They are widely used for lapping of parts such as adding machines, engines, transmissions, cameras and projectors, tool and die equipment and quartz and germanium crystals. Materials include monel, steel, stellite, brass, aluminum, glass, carbon, plastics, ceramics and others. For full information contact Crane Packing Co., Dept. DPL, 6400 Oakton St., Morton Grove, Ill. (Chicago Suburb).

Literature on Thin-Wall Tubing

The first literature it has ever produced on large diameter thin-wall tubing has just been prepared by Superior Tube Company, Norristown, Pa. Known as Data Memorandum No. 4, the literature describes tubing in sizes with outer diameters from ⅝ to 2½-in. and with wall thickness of .035-in. and less. Superior produces this large diameter thin-wall tubing in both the seamless and Weldrawn grades for application to a wide variety of products. The Weldrawn is fusion welded from strip and cold drawn to size.

As the data memorandum points out, design engineers are finding out that Superior's large OD thin-wall tubing answers many design problems requiring such properties as light weight, good heat transfer, close tolerances, ductility and bright, clean OD and ID surfaces. Typical applications listed include aircraft ducting, fuel and oil lines, heat exchanger and cooling system tubing, bellows, flexible metal hose, ceramic drills, solenoid cylinder cores, textile machinery rollers, hydraulic brake cylinder lines and casings and envelopes for such products as fractional horsepower motors, stators, electron power tubes and well-logging instruments.

A section on fabrication gives useful information on bending, beading, flaring and welding the thin-wall tubing. A table on standard production limits lists sizes and wall thicknesses for more than 20 analyses in which this type of tubing is produced. Types include stainless, nickel and nickel alloy, carbon and alloy, beryllium copper and titanium. Other tables give the standard tolerances for size, ovality, straightness and length. Copies of Data Memorandum No. 4 on large diameter thin-wall tubing are available free on request by writing to Superior Tube Company, 1774 Germantown Ave., Norristown, Pa.

Tachometer Takeoff Head

Tachometer takeoff heads (Series 34), used with Metron Indicators, measure speeds between 100 and 5000 rpm. They are now available with A. N. screw mounts for aircraft tachometer takeoffs, and also with S. A. E. screw mounts for gasoline, diesel, marine, railway or stationary engines and compressors. Rugged construction gives long life under continuous operation according to the manufacturer. No brushes, slip rings or other parts that need regular maintenance or replacement are used. A double pole, double throw (dpdt) switch with a capacitor senses speed when the takeoff shaft rotates either direction. A current (exactly linear with respect to speed) is transmitted to a centrally located Metron Indicator up to 1000 feet away. Very little operating torque is required. Either one of two stainless steel keyed shafts are standard. Also available are two alternate shafts: $\frac{5}{16}$ in. round and ¼ in. square. Heavy duty ball bearings are ⅝ in. O. D. Since these takeoff heads use a dpdt switch (not a generator), they must be combined with a Metron Indicator. (ITS NEW)

With all the technological advances in fuel injection equipment and all the training received by men to make them into diesel operators, an air bound fuel pump still refuses to inject fuel and there are still a good percentage of men who have not learned that simple fact of life.

Municipal Power Plant

Relies on **Young** *Coolers*

Young Horizontal Core Radiators cool jacket water serving the 3 power plant engines.

Fairbanks-Morse 960-HP O-P Dual-Fuel engines supply power and light to Brackenridge, Pa.

Young "HC"® Units
Cool Dual-Fuel Engines

Another example of Young-preference when it comes to *dependable performance required!* When Brackenridge, Pa., built its own power plant rather than buy from expensive and impractical outside sources, this community wisely specified dual-fuel engines cooled by Young radiators. Effective and efficient use of fuels, gas and oil, enables the power plant to operate with sizeable savings to Brackenridge.

Young HC Horizontal Core units are available for water, oil, gas cooling and steam and vapor condensing in any combination. HC features include, (1) low speed fan gives high efficiency performance at minimum horsepower requirements and low operating cost, (2) vertical air discharge provides even air distribution—eliminates air recirculation and effects of cross winds, (3) compact Young design permits space-saving, in-line installations of 2 or more units for additional capacities and services. Young HC units combine *efficiency, economy, versatility.*

Write for Free Catalog No. 550 Dept. 407-A

Put Young Talent to work for you . . .

Solving heat transfer problems is what we do best because it is our very reason for being. You, too, can harness the power of Young engineering talent. Write, wire or call without obligation.

HC is a registered trademark.

Young RADIATOR COMPANY
RACINE, WISCONSIN

Creative HEAT TRANSFER ENGINEERS FOR INDUSTRY

Heat Transfer Products for Automotive, Aviation and Industrial Applications. Heating, Cooling, Air Conditioning Products for Home and Industry.

Executive Office: Racine, Wisconsin, Plants at Racine, Wisconsin, Mattoon, Illinois

Executive Vice President Elected

Walter L. Brough

Walter L. Brough, who has been serving as Assistant to the President since joining the organization two years ago, has been promoted to the office of Executive Vice President of Hercules Motors Corporation, manufacturer of gasoline and diesel engines, at Canton, Ohio. The announcement of his election was made this week by John C. Keplinger, President, following a meeting of directors. Mr. Brough, a graduate of Fenn College in Cleveland, Ohio, with a degree of Bachelor of Science in Mechanical Engineering, was associated with the Timkin Roller Bearing Co. and the Central Alloy Division of Republic Steel Corp., before joining Hercules Motors Corporation.

Joining the Timkin organization in 1937, after his graduation from college, he served there in various capacities in plant operation and engineering until 1953 when he joined Republic Steel. During his period of service with the Timken company he served with the U. S. Navy as an ordnance engineering officer from 1943 through 1946 and from 1951 to 1953. Mr. Brough is a registered professional industrial engineer and a member of the American Society of Mechanical Engineers. He also is a graduate of the advanced management program of the Graduate School of Business Administration of Harvard University. He was born July 3, 1914 at Wesleyville, Pa., near Erie, attending grade and high school there. He is married and the father of two children and resides with his family in Canton, Ohio.

Valve Seat Inserts of Solid Cast Eatonite—

Last Longer—
make Valves Last Longer

For engines in heavy-duty service where high operating temperatures are experienced over extended periods of time, Eaton Valve Seat Inserts have proven their ability to materially reduce valve and insert failures, to maintain a high level of engine output—and to add extra thousands of trouble-free hours to valve life.

Eaton engineers will be glad to discuss the application of Eatonite Valve Seat Inserts with your engineering and metallurgical departments.

MAXIMUM DURABILITY

High Hot Strength

High Hot Hardness

Freedom from Corrosion, Wear, Cracking, Loosening

EATON

SAGINAW DIVISION
MANUFACTURING COMPANY
9771 FRENCH ROAD · DETROIT 13, MICHIGAN

New Harbormaster Units

New Utility Series Harbormaster outboard propulsion and steering Units, offering practically all the advantages of standard Harbormasters at considerably lower cost, are announced by Murray & Tregurtha, Inc., Quincy, Massachusetts. Harbormasters are complete, heavy-duty marine power and steering units, providing many features not found with ordinary marine power. They are easily installed on new or existing craft such as barges, towboats, work boats, etc., and they are efficient and economical to operate and maintain.

Available in 40 hp and 60 hp gas or diesel models, the new Utility Series Harbormasters provide the same heavy-duty performance and high thrust per horsepower as comparable standard models.

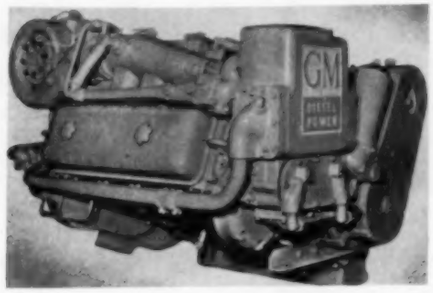
The Utility Models provide outboard-style maneuverability, with propeller-thrust steering from 30° port to 30° starboard. The outboard drive section elevates above the deckline for repairs and maintenance. Large diameter propellers provide good heavy-load characteristics. Shear pin protection and other features of the standard models are also included.

Standard-Model Harbormasters from 40 to 400 hp have been proved in extensive commercial use since 1945. The new Utility Series, because of the lower cost, should have even wider application and acceptance. Write Murray & Tregurtha, Inc., 80 Hancock Street, Quincy 71, Massachusetts for complete information. (ITS NEW)

Motor Boat Show Exhibit

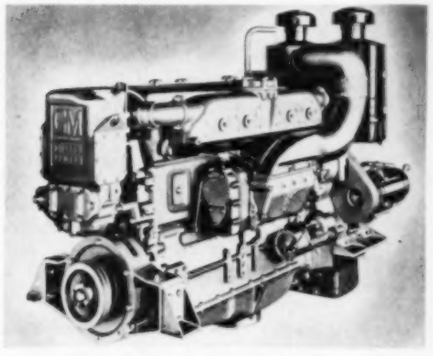
Entirely new additions to its line and advances made in standard models during the last year give the Detroit Diesel Engine Division of General Motors a new versatility in providing practical diesel drive for almost any type of boat from 21

ft up. New models to be shown for the first time at the 1957 National Motor Boat Show add to Detroit Diesel's power range and also offer greater flexibility in the selection of GM diesel propulsion units.



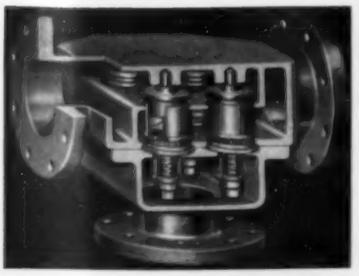
Inclined Turbopower four cylinder Detroit Diesel marine engine rated 197 shp at 2300 rpm.

Heading the Division's exhibit are two new Turbopower engines in the 71 series which add two horsepower ratings to the line. These are six-cylinder vertical and four-cylinder inclined diesels of 271 and 197 shaft hp, respectively. These units will be displayed for the first time as matched pairs in two attractive exhibits. In these models Turbochargers, working with the engine blowers, supplement the air supply to the cylinders to effect a 17 per cent increase in horsepower or a 15 per cent reduction in fuel consumption. The increased engine efficiency is attained with no increase in weight-to-horsepower ratios. The inclined models displayed have aluminum block and other component parts for lighter weight and their layed-over design further reduces installation height.



Newly designed 6-110 propulsion unit with high-capacity Roots blower to provide a more compact power unit.

In the work boat field a newly designed 6-110 marine diesel with front-power take-off will have its first public showing. A high capacity Roots-type blower similar to that used on the Division's Series 71 models has been adopted for this unit. Because of the lateral location of the blower and its compactness substantial reductions in overall height and length are attained along with space for additional accessory drives. The blower also provides increased air supply to the cylinders for improved performance especially in the lower speed ranges. Maximum rating is 289 shaft hp at 2000 rpm or 220 continuous shaft hp at 1800 rpm. In addition to these models activated cutaway units will be on hand to demonstrate the two-cycle design of all Detroit Diesel engines.



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√ Provided for by rugged AMOT element construction. No AMOT element has ever stuck closed since its introduction 6 years ago. Many years of "know how" are built into every AMOT element.

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MODELS ½" to 6" pipe sizes. Larger sizes in iron, bronze or ductile iron.

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DREDGE M.O.P. DH-6

Photo courtesy Ellicott Machine Corporation

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Almost everywhere . . . wherever you find marine Diesels . . . large or small . . you find Briggs filters *protecting* the owner's investment. The USS GLACIER the USS FORRESTALL, to name others. If you plan to use filtration of any kind, size or type, by all means read our new marine booklet featured here.

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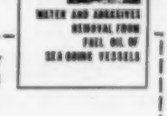
MAIL THE COUPON FOR YOUR COPY OF OUR NEW BOOKLET "WATER AND ABRASIVES REMOVAL FROM FUEL OIL OF SEA GOING VESSELS" PLUS UP-TO-DATE MARINE DATA.



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Cooper-Bessemer Promotes

The promotion of J. P. Matthews to Turbocharger Application Engineer is announced by Ralph L. Boyer, Vice-President and Chief Engineer, The Cooper-Bessemer Corporation. In his new engineering capacity, Mr. Matthews will work directly under John Fullemann who presently directs all engineering development work on Cooper-Bessemer rotating equipment.

A graduate in Mechanical Engineering from Purdue University, Mr. Matthews has devoted his major efforts to Cooper-Bessemer's program of product improvement and expansion of its line of engines and compressors. Most recent of this activity has been the development of Cooper-Bessemer air conditioning equipment for turbocharging its 4-cycle engines.

Twin-Power Scraper Catalog

Euclid Division of General Motors Corporation has just released new literature describing the Model TS-18 twin-power scraper. The new catalog explains the twin-power principle, pioneered by Euclid in the off-the-highway field in which there are two engines of 218 hp each, one in the tractor and one behind the scraper bowl, each driving an axle through a separate Torqmatic Drive.

A 300 hp engine is available in the tractor where even more horsepower is desired. The twin power trains permit efficient self-loading of this overhung engine scraper and independent operation under adverse conditions where conventional scrapers require a pusher tractor.

Action views show how hydraulic lever action of apron, bowl and ejector provides fast, independent control of all scraper operations. Only 16 ft of cable on the apron lift minimizes the costly problem of downtime from cable breakage. Condensed specifications and a performance graph are included in the catalog to provide data on engines, transmissions, tires, scraper controls, weights and dimensions, speeds and grade ability. Copies of the catalog, Form 552, are available from Euclid dealers or Euclid Division, General Motors Corporation, Cleveland 17, Ohio.

District Manager

Melville E. Ingalls has been appointed District Manager of Sales by Nickel Cadmium Battery Corporation, Easthampton, Massachusetts. He will cover Eastern United States from the New York Office at 1475 Broadway. Mr. Ingalls was formerly associated with the New York Central Railroad and the American Car and Foundry Company.

Manufacturing Appointment

J. F. Costigan has been appointed assistant director of manufacturing of Allis-Chalmers Industries Group. Costigan had been works manager of the company's Norwood (Ohio) Works since January, 1953. He started his career with Allis-Chalmers in 1918 as a machinist in the West Allis shops, moving through a succession of positions in the manufacturing department there until he was named an assistant to the general works manager of the Industries Group at West Allis Works in 1945. In 1951 he was transferred to the Norwood Works as assistant works manager, a position he held until his promotion to works manager there. Costigan succeeds Arnold I. Thorsen, who was recently named general manager of Allis-Chalmers Terre Haute (Ind.) Works.

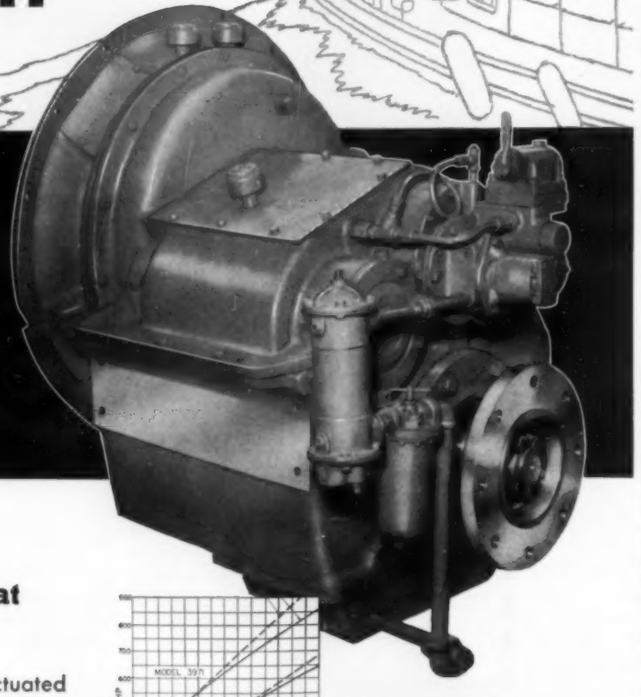
Most engines have a way of starting to knock now and then but it is generally of no consequence and does less harm than the man similarly disposed.

CLIMAXING 50 YEARS OF BETTER GEARS

SNOW-NABSTEDT

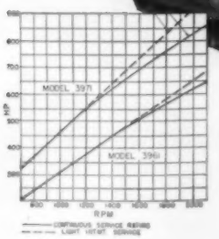
proudly presents 2 new Marine Reverse Reduction Gears

Engineered to Transmit the Maximum Power of Modern, High-Speed, Heavy-Duty Diesel Engines



More Power for Every Type of Boat

The new S-N 3900 Series hydraulically actuated gears are designed especially for high-speed, heavy-duty diesel engines from 200 to 800 horsepower. They embody the most advanced features and are engineered for maximum dependable power. Whether you are a single boat or fleet operator, marine distributor or engine manufacturer, you will want all the facts on the 3900 Series for new installations and for repowering. See your S-N distributor or write direct for further information.



S-N Engineers are at your service. Certified prints gladly sent upon request.

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Transmission Engineers
FOR HALF A CENTURY
"MAKERS OF JOE'S GEARS"
THE SNOW-NABSTEDT GEAR CORP., HAMDEN, CONN.

50th ANNIVERSARY S-N GEARS FIFTY YEARS OF BETTER GEARS

Sales Manager

Joy Manufacturing Company, Pittsburgh, Pa., has announced the appointment of John P. Cartwright as Sales Manager, Industrial Sales. Mr. Cartwright will headquarter in the company's general offices in Pittsburgh.

After serving as a line officer aboard a heavy cruiser following his graduation from the U. S. Naval Academy at Annapolis, Mr. Cartwright joined the Joy organization in 1950. He subsequently became sales representative in the Washington, D.C. district, and Washington District Manager. Succeeding Mr. Cartwright as Washington District Manager is Arnott J. Lee, who has worked in various sales and sales promotion capacities since joining the company in 1934. Mr. Lee is a graduate of the University if North Dakota with a degree in Mining Engineering.

Representative Appointed

Mr. R. A. Darling of the R. A. Darling Company, Wheat Ridge, Colorado, has been appointed sales representative for Colorado, Wyoming, Western South Dakota and Western Nebraska by J. F. Pritchard and Company of California. Pritchard designs and manufactures cooling towers for air conditioning and industrial applications and Hydryers, packaged units for the dehydration of air and other gases.

Mr. Darling has been a manufacturer's representative since October, 1954 and now serves several leading equipment manufacturers. From 1944 to 1954, he was a sales engineer for the Cooper-Bessemer Corporation in the Tulsa area. Prior to that time, he spent four years, starting in 1940, with the Cooper-Bessemer Corporation in production, engineering and sales capacitites at Mt. Vernon, Ohio and Grove City, Pa. Mr. Darling graduated from Oklahoma A & M College in 1940 with a B S Degree in Mechanical Engineering.

Executive Advancements

Announcement was made recently by Ralph F. Peo, chairman of the board and president of Houdaille Industries, Inc., of two advancements on the company's executive staff. E. M. Schugar, who since 1949 has been vice-president and general manager of Buffalo Arms, Inc., at Akron, N.Y., a Houdaille subsidiary, has been made a vice-president of Houdaille Industries, Inc., in charge of government contracts. R. V. Miraldi, who since December 1955 has been engineering assistant to G. C. Saltarelli, vice-president in charge of operations of Houdaille, has been elected vice-president and group executive in charge of Buffalo Arms, Inc.; the Wales-Strippit Company, another subsidiary, and the Buffalo Hydraulic Division of Houdaille.

Booklet on Emergency Power

Emergency Power For Your City Water Works is the title of an informative booklet just released by the Detroit Diesel Engine Division of General Motors. The booklet outlines the importance of having standby power available to safeguard this vital activity and pictures Detroit diesel installations already made throughout the country. A copy of the booklet can be obtained from Detroit Diesel Distributors or by writing Detroit Diesel Engine Division, General Motors Corporation, Detroit 28, Michigan.

NOW AVAILABLE! The Completely new Volume 21 of **DIESEL ENGINE CATALOG.** This giant, fully illustrated reference book containing complete and detailed engine and accessory sections is bigger, better than ever before. Mail orders are now being filled for this "Bible of the Industry," which has been revised, rewritten and brought up to date completely from cover to cover. Orders are being accepted for this limited edition, which costs $10 postpaid plus California sales tax where applicable. Send checks or company order forms to **DIESEL PROGRESS,** 816 N. La Cienega Blvd., Los Angeles 46, California.

Powered by White's Superior Diesels

. . ."Andrew B" handles easily and saves fuel

The "Andrew B," a 1400 hp towboat built for the Cumberland River Sand and Gravel Company by the St. Louis Shipbuilding & Steel Co., is dependably powered by two of White's Superior Model 40, 4-cycle, 8-cylinder, supercharged-intercooled diesel engines. Each engine is rated 700 bhp continuous at 800 rpm. Through Falk reverse and reduction gears, they turn twin 74-inch, 4-blade propellers at 266 rpm.

The towboat is in almost continuous service, totaling 5,027 hours in less than 9 months, pushing heavily laden sand and gravel barges along the narrow, winding Cumberland. Because of the quick response and stamina of Superior diesels for rugged towboat duty, the owners report unusually easy handling. And even under adverse load conditions in short haul service, with about 40% of running time consumed in locking, the owners are more than pleased with fuel economy. They report using only 39.3 gallons per hour.

White's Superior engines are built especially for utmost dependability and greatest operating economy in towboats, tugs, dredges, fishing vessels and other workboats. They are rugged, high-quality, heavy-duty diesel engines that provide more years of trouble-free, profit boosting performance at the lowest possible operating costs. When you choose a diesel requiring 325 to 900 bhp for a new boat or repowering, you can rely on White's Superior Model 40 Diesels. Get complete information at offices listed below.

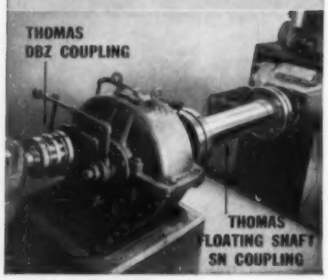
White Diesel

WHITE DIESEL ENGINE DIVISION

THE WHITE MOTOR COMPANY Plant and General Offices: Springfield, Ohio

SALES AND SERVICE POINTS: Gloucester, Mass. • Houston, Ft. Worth, Texas • San Diego, Oakland, Terminal Island, California • Ketchikan, Alaska • Washington, D.C. • Portland, Astoria, Ore. • Denver, Colorado • Halifax, Nova Scotia • Vancouver, B.C. • Park Rapids, Minn. • New York • Chicago • Seattle • New Orleans • St. Louis • Wichita, Kansas

Freedom From Coupling Maintenance



Install Thomas Flexible Couplings

First cost is *only* cost when you buy Thomas Flexible Couplings . . . because Thomas Flexible Couplings are correctly engineered . . . have no wearing parts . . . need no lubrication . . . eliminate future maintenance costs. Even more, Thomas all-metal couplings are open for inspection while running—ending inspection shut-downs!

For all practical purposes, properly installed and operated within rated conditions, Thomas Flexible Couplings will last forever.

NO LUBRICATION . . .
NO MAINTENANCE . . .
There Are No Wearing Parts

Under load and misalignment, only Thomas Flexible Couplings offer all these advantages:

1. Freedom from backlash—torsional rigidity
2. Free end float
3. Smooth, continuous drive with constant rotational velocity
4. Visual inspection while operating
5. Original balance for life

Write for Engineering Catalog 51A

THOMAS
FLEXIBLE COUPLING CO.
WARREN, PA.

New Alternator Design

A 900 rpm ac alternator of eight-pole mono-coil design has been designed by Kato Engineering Co., Mankato, Minnesota. The generator is believed to be the first of its kind. The machine is 220/440 volt, delta connected, three phase. Rotor castings encompass the field coil and the complete rotor assembly is coated with highest grade varnish that will not crack, making one homogeneous mass. The 10 kw alternator is designed to be powered by a 900 rpm diesel engine, ensuring extra long engine and generator life.

A.E.D. Convention

The 38th Annual Meeting of Associated Equipment Distributors on January 27th-30th, 1957, at the Conrad Hilton Hotel in Chicago will be the biggest convention in the history of the Association, according to an announcement from A.E.D. headquarters. Advance registration figures indicate that a record-breaking attendance of more than 3800 distributor and manufacturer members of A.E.D from every section of the United States, Canada and U. S. Territories will be on hand for the four-day event.

High on the list of subjects to be discussed at the A.E.D. Annual Meeting are distributor-contractor relations and the problems of equipment financing, which today are among the most highly talked about topics in the industry. The Association plans that meetings will orientate members on methods of improving their business operations, provide a forum for discussion of problems, and review recent developments and progress made throughout the industry. The Meeting will also feature an array of distinguished speakers.

Something new has been added to the '57 convention. More than 100 manufacturers of construction equipment and accessories will place their products on display at a special Conference, Display and Exhibit Center—termed Condex for short—to be held in the exhibition halls of the Conrad Hilton Hotel. Covering some 40,000 sq ft of exhibit space, Condex will open on Sunday afternoon, January 27th, and will run through Wednesday evening, January 30th, when A.E.D.'s convention will adjourn. Meanwhile, the American Road Builders' mammoth Road Show will be in progress at the International Amphitheater during the entire week, from January 28th through February 2nd. By agreement, only A.E.D. manufacturer members not participating in the Road Show itself will display their products at Condex.

The Meet Your Manufacturer sessions, a popular feature of past meetings, have been discontinued this year due to the participation of most manufacturers in either Condex or the A.R.B.A. Road Show. The highlight of the A.E.D. Convention will be the election and installation of officers for 1957. Business sessions will again feature the Local Group Clinics where officials of local distributor associations get together for an informal exchange of ideas for useful and constructive programs.

The social calendar offers a well-rounded program sparked by top-flight professional entertainment. The annual pacesetter, the Early Birds' Breakfast on the opening day of the Convention, will honor outgoing A.E.D. President Stan Laskey, Northwestern Equipment, Inc., Fargo, N. Dak. Other events include the Welcoming Luncheon and the Association's 38th Annual Birthday Party. Highlighting the Birthday Party is the traditional installation of national officers for the coming year. The members' wives have a full schedule in store for them while their husbands are attending to convention business. There will be a special headquarters for the ladies as well as a host of activities and entertainment features.

Directing the planing and arrangements for the A.E.D. Meeting is a six-man Convention Committee headed by R. F. Newlin, Newlin Machinery Corp., Kansas City, Kansas. Working with Newlin are: L. P. Deephouse, Deephouse Equipment Co., Berlin, Conn., P. M. Moninger, Capital Equipment Co., Richmond, Va.; Don F. Nickel, Don F. Nickel Equipment Co., Grand Rapids, Mich.; W. A. Patterson, Richards Equipment Co., Waco, Texas; and, C. C. Tambornino, The George T. Ryan Co., Minneapolis, Minn.

DEMA Elects President

Walter A. Rentschler

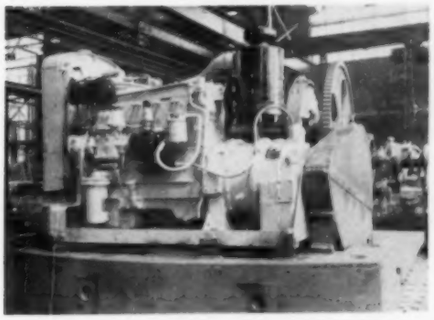
Walter A. Rentschler, vice president and a director of Baldwin-Lima-Hamilton Corporation, Philadelphia, and general manager of its Hamilton Division, Hamilton, O., has been elected president of the Diesel Engine Manufacturers Association. Rentschler, an association vice president and director, succeeds Thomas E. Hughes as president on January 1. Hughes is general manager of the Cleveland Diesel Engine Division of General Motors Corporation. Elections were held at DEMA's annual meeting in Chicago November 14.

Also elected then, to a vice presidency of the association, was Guy J. Coffey, president of the Chicago Pneumatic Tool Company, New York City. William E. Butts, president of General Metals Corporation, San Francisco, was reelected a vice president, and Robert H. Morse, Jr., president of Fairbanks, Morse & Company, Chicago, was renamed treasurer. Robert L. Stanley, DEMA's educational director and a resident of Falls Church, Va., was elected executive secretary and executive director to succeed Harvey T. Hill, long-time industry figure, who retires the first of the year.

Also, five directors were reelected at the annual meeting. They are Coffey, Butts, Otto H. Fischer,

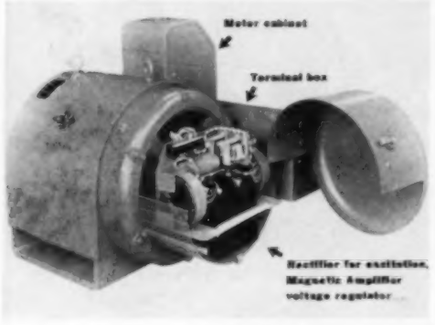
president of The Union Diesel Engine Company, Oakland, Calif.; Robert E. Friend, president of Nordberg Manufacturing Company, Milwaukee, and Lawrence F. Williams, president of The Cooper-Bessemer Corporation, Mt. Vernon, O. At the same time, it was announced that the offices of the association, which represents virtually all builders of large, heavy-duty diesel engines, would move its offices from Chicago (One North La Salle Street) to 2000 K Street, N. W., Washington, D. C.

Diesel For the Road Show



This illustration shows a Cummins JBIS-600 torque converter unit being installed in a Lima 44 shovel. This Cummins diesel is similar to one that will be shown at the ARBA Road Show in Chicago, and shows the trend in power to compact engines driving through torque converters in construction equipment. Also note the simplified PT fuel injection system on this engine.

New Packaged Generator



The new Amp-Pak Packaged Generator introduced by Electric Machinery Mfg. Company uses (1) a built-in rectifier for excitation instead of a conventional rotating exciter, and (2) a magnetic amplifier voltage regulator, with no moving parts or vacuum tubes, to provide accurate, quick response voltage regulation. This entirely static arrangement features important maintenance advantages. There are no exciter brushes or commutator to maintain. The rectifier, located in the incoming air stream, needs nothing more than occasional blowing out to remove dust. The magnetic amplifier voltage regulator has no vibrating contacts, other moving parts or vacuum tubes, and requires little or no maintenance.

All necessary components of the packaged generator, including the excitation system, voltmeter, ammeter, and voltage adjusting rheostat, are mounted on the generator itself, so that all wiring between the generator and the exciter-regulator components is done at the factory instead of in the field. Amp-Pak packaged generators are available in 3 phase ratings of 75-187 kva at 1800 rpm and 62½–187 kva at 1200 rpm. Output voltage may be 120/208, 240, 180, or 600. Voltage regulation of ± 2% is guaranteed.

Packaged generators are widely used with engines for standby and field service. The generator may be single bearing or two bearing coupled, or belted to the engine.

Motor Boat Show

Topping more than a half century of nautical expositions, the National Motor Boat Show to be held in the New York Coliseum Jan. 19-27 has over 350 different exhibits of boats, marine engines and accessories signed up, according to Joseph E. Choate, Show manager. Filling more than seven acres on four floors of midtown Manhattan's glamorous new showplace, the 1957 edition of the recreational boating extravaganza will feature displays of 49 outboard boat companies, 46 manufacturers of inboard cruisers and runabouts, and 18 sail boat builders. Vying for top billing with the boats will be complete presentations of the 1957 lines of 18 inboard gasoline and diesel engine companies and 10 outboard motor manufacturers.

To complement the boat and engine displays, there will be 74 manufacturers exhibiting lines of marine hardware and nautical accessories; 27 paint and surface coating companies; 24 manufacturers of engine and propulsion equipment; 20 producers of electronic devices; 13 canvas and cordage firms, and 12 boat trailer manufacturers. A dozen distributors, jobbers and dealers have taken booths as have 10 boating magazines, one newspaper featuring boat coverage, seven marine insurance and boat financing companies and four makers of nautical wearing apparel. Rounding out the display will be seven educational exhibits designed to encourage safe, happy enjoyment of the waterways.

Returning to a four-floor layout after three years of a single-floor show in Kingsbridge Armory, the Motor Boat Show will again be departmentalized for greater appeal to the boating public. Outboard enthusiasts will find the first floor dominated by outboard boats, motors and boat trailers. Inboard cruisers and runabouts, larger sail boats, gasoline and diesel engines will fill the second floor. The third floor will be devoted to small inboard engines, marine accessories and outboard boats and motors. Additional small craft, nautical accessories, inboard and outboard power plants and educational exhibits will highlight the fourth floor display.

The next time you decide to save a buck by reusing an old cylinder head gasket, have in mind that on this last repair job you had to tear it down again and put in a new one after all.

America's Largest GM fuel injector rebuilder
Interstate
diesel service incorporated
7120 Carnegie Ave. • Cleveland 3, Ohio
Products sold exclusively through dealer and distributor organizations throughout the United States and Canada. Dealer inquiries welcome

MODERN SLOW SPEED
DIESEL ELECTRIC GENERATOR SETS
• 600 RPM— Worthington BB5 100kw 3/60/480
• 720 RPM— Enterprise DSX-26 300kw 3/60/480
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Complete With All Auxiliaries
Other Sets From 20kw to 1200kw
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DIESEL ENGINES: With or Without Generator
FAIRBANKS-MORSE, 80 HP, 120 HP, 240 HP, 360 HP, 450 HP, 600 HP, 1000 HP.
NATIONAL SUPERIOR 960 HP Dual Fuel, and many others
PARTS: Pistons, Cylinders, Crankshafts, Nozzles, Pumps, Flywheels, etc.
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AGSCO ENGINEERED DIESEL POWER
STATIONARY — PORTABLE — MOBILE & MARINE
New and Remanufactured 100 to 2000 HP 60 to 1500 KW
New Parts For All Engines Write for Brochure
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Complete facilities for grinding, plating, Magnafluxing, and electrically-controlled heat-treating.
Largest hard-chrome plating plant in the Mid-Continent area. Experience • Quality • Precision
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CRANK-SHAFT REPAIRS

- REGRINDING
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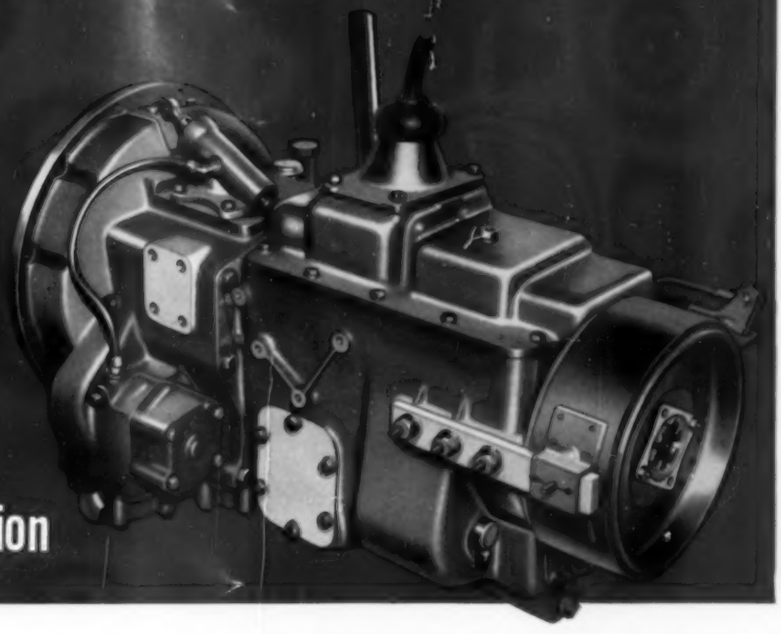

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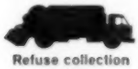

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